

# TRADE TRAINING ATC PROGRAMME

## MILLWRIGHT


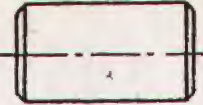


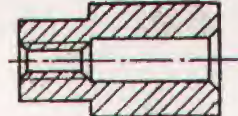
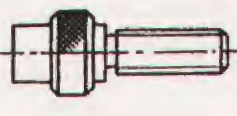


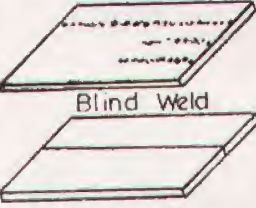

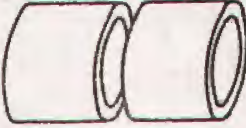

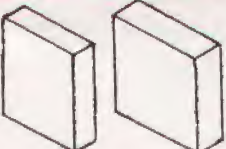
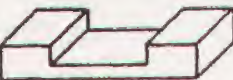

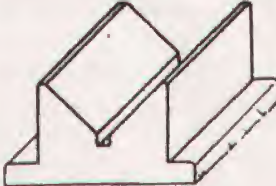
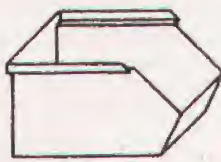
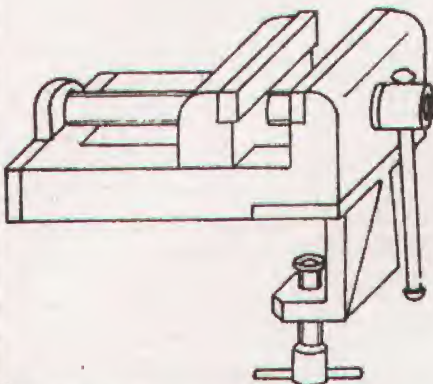
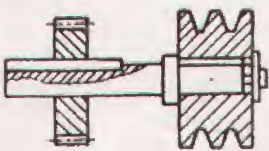
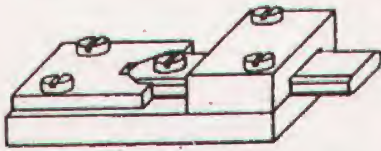
DEVELOPMENT CELL  
FOR SKILLED LABOUR TRAINING  
DIRECTORATE OF MANPOWER & TRAINING  
GOVERNMENT OF THE PUNJAB  
LAHORE



Price Rs : 18.00

T.T.P Series No. 19



TURNING 1.0.4/1-8			
			
1 → 5	2 → 3	2 → 3 → 4	3 → 4 → 6
			
1 → 5 → 7	4 → 6 → 8	5 → 7 → 8	6 → 8 → 7
WELDING 2.0.2/1-5			
			
Square butt weld	Double flanged butt weld	Pipe butt weld	Corner weld
1-2	3	4	5
SHAPING 2.3.3/1-4			
			
Parallel and square shaping	Form shaping	Form shaping, Chamfer shaping	Tool-head setting, Form shaping
1 → 2.3.5/2	1a → 3.3.1/6	2 → 2.3.5/2	3
FITTING 2.3.5/1-4			
			
Store box	Bench vice		Shaft with pulley and gear
			
Gauge			
1	2	3	4
TRADE TRAINING	LAYOUT		No. 1.0.4 No. 2.0.2 No. 2.3.3 No. 2.3.5
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME			MILLWRIGHT



# MATERIAL REQUIRED

Trade Training for Millwright

Turning No. 1.0.4	Exercise No. (Length given in millimeter)					Length per trainee	Total length for a batch of 16 trainees
	1	2					
M/S Round 60 mm (2 1/2")	85	90				175 mm	2,9 meter
Welding No. 2.0.2	Exercise No. (Length given in millimeter)					Length per trainee	Total length for a batch of 16 trainees
	1	2	3	4	5		
M/S Sheet 1mm (S.W.G. 19)	80x150		60x150			300 x 80 mm	0,5 meter <sup>2</sup>
M/S Sheet 2,5 mm (S.W.G. 13)		50x120				50 x 120 mm	0,1 meter <sup>2</sup>
M/S Pipe ø 40mm (1 1/2")				100		100 mm	1,8 meter
M/S Sheet 3 mm (S.W.G. 11)					80x120	80 x 120 mm	0,2 meter <sup>2</sup>
Shaping No. 2.3.3	Exercise No. (Length given in millimeter)					Length per trainee	Total length for a batch of 16 trainees
	1	2	3	4			
M/S Flat 95 x 12 mm (3 7/8 x 1/2")	65					65 mm	1,1 meter
M/S Flat 65 x 15 mm (2 1/2 x 5/8")		35				35 mm	0,6 meter
M/S Flat 35 x 15 mm (1 1/2 x 5/8")			130			130 mm	2,2 meter
Cast iron according pattern				X			

Contd: back page



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MILLWRIGHT



## MATERIAL REQUIRED

### Trade Training for Millwright

Fitting No. 2.3.5	Exercise No. (Length given in millimeter)					Length per trainee	Total length for a batch of 16 trainees
	1	2	3				
M/S Sheet 0,75 mm (S.W.G. 22)	320x 550					320 x 550 mm	3 meter <sup>2</sup>
M/S Flat 50 x 6 mm (2" x 1/4")		45				45 mm	0,8 meter
M/S Flat 35 x 6 mm (1 1/4" x 1/4")		80				80 mm	1,4 meter
M/S Flat 25 x 6 mm (1" x 1/4") Part No 6			35			35 mm	0,6 meter
M/S Round 15 mm (5/8") Part No 12			68			68 mm	1,2 meter
M/S Round 8 mm (3/8") Part No 13			60			60 mm	1,0 meter
M/S Round 20 mm (3/4") Part No 14			10			10 mm	0,2 meter
Brass Round 25 mm (1") Part No 15			5			5 mm	0,1 meter

All other materials as screws, washers and pins for the fitting course should be supplied according to drawing.



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

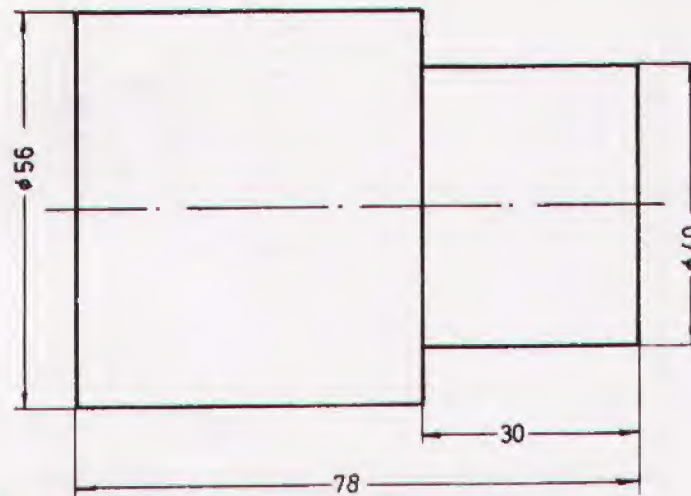
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MILLWRIGHT





TOLERANCE  $\pm 0.2$



### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		4-JAW INDEPENDENT CHUCK RIGHT-HAND FACING TOOL	CLAMPING FACING
2		RIGHT-HAND ROUGHING TOOL	LONGITUDINAL TURNING
3		RIGHT-HAND SIDE TOOL	SHOULDER FACING
4		RIGHT-HAND SIDE TOOL	STEP TURNING TO DEPTH 30 MM AND DIA 40 MM
5		3-JAW CHUCK RIGHT-HAND SIDE TOOL	FACING TO LENGTH 78 MM
6	LONGITUDINAL TURNING TO DIA 56 MM. NUMBER PUNCHING.		

SCALE 1:1

MAT. ST.37-1

## STEPPED BAR

NO:- 1.0.4 / 01

BASIC / TURNING



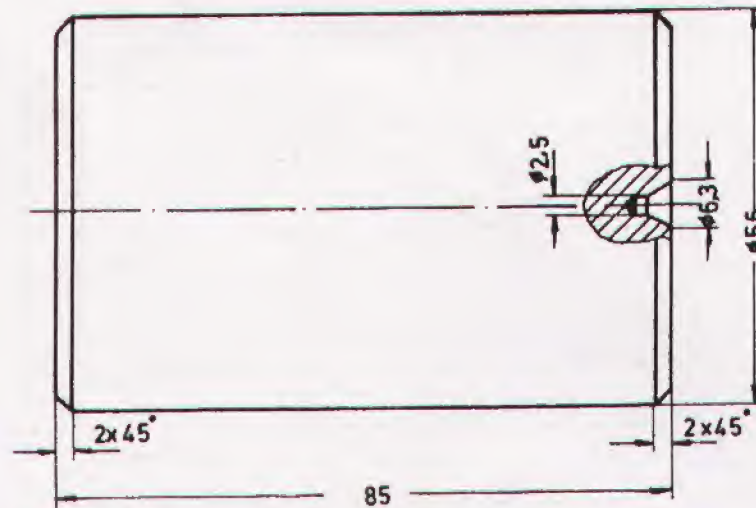
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





TOLERANCE  $\pm 0.2$



### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		4-JAW INDEPENDENT CHUCK RIGHT-HAND FACING TOOL	CLAMPING FACING
2		DRILL CHUCK CENTRE DRILL 2.5 MM	CENTERING
3	RECLAMPING, FACING TO LENGTH 85 MM. CENTERING.		
4		DRIVING PLATE DOG CARRIER RIGHT-HAND ROUGHING TOOL	HOLDING BETWEEN CENTRES ROUGH TURNING TO DIA 56 MM
5		RIGHT-HAND SIDE TOOL	RESETTING, ROUGH TURNING TO DIA 56 MM
6		RIGHT-HAND SIDE TOOL	CHAMFERING

SCALE 1:1

MAT. ST. 37-1

## ROUND BAR

NO. 1.0.4 / 02

BASIC / TURNING



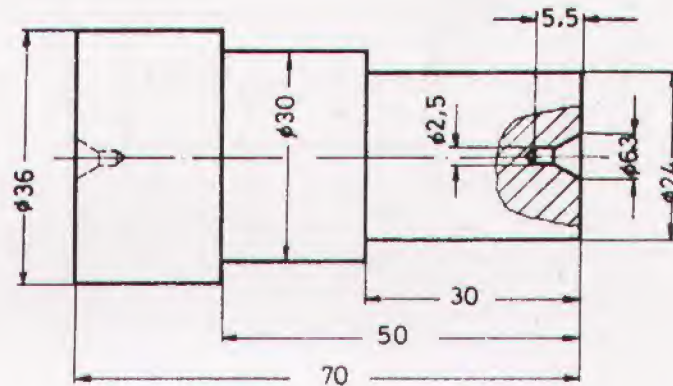
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Tolerance  $\pm 0,1$



### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		3-JAW CHUCK FACING TOOL	TRUE SETTING WITH DEAD CENTRE FACING TO LENGTH 70 MM
2		DRILL CHUCK CENTRE DRILL 2.5 MM	RECENTERING
3		DRIVING PLATE DOG CARRIER RIGHT-HAND SIDE TOOL	STEP TURNING TO DEPTH 50 MM AND DIA 30 MM
4		RIGHT-HAND SIDE TOOL	STEP TURNING TO DEPTH 30 MM AND DIA 24 MM
5		RIGHT-HAND SIDE TOOL CLAMPING BUSH	RESETTING, TURNING TO OUTSIDE DIA 36 MM

SCALE 1:1

CENTERED BOLT

No. 1.0.4/03

MAT. from Ex. 02

BASIC / TURNING



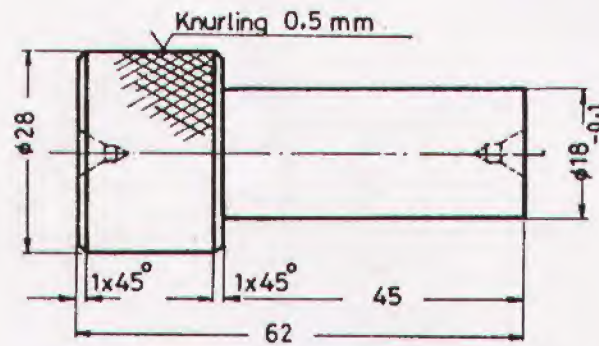
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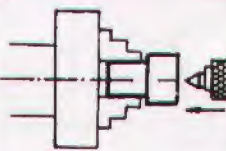
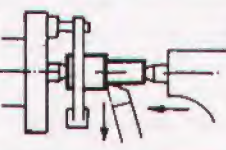
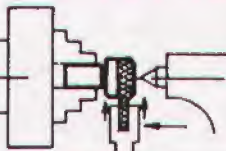




Tolerance  $\pm 0.1$   
unless otherwise stated



### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		3-JAW CHUCK FACING TOOL RIGHT-HAND SIDE TOOL	TRUE SETTING WITH DEAD CENTRE, FACING TO LENGTH 62 MM, TURNING TO OUT- SIDE DIA 28 MM CHAMFERING
2		DRILL CHUCK CENTRE DRILL 2.5 MM	RECENTERING
3		DRIVING PLATE DOG CARRIER RIGHT-HAND SIDE TOOL	STEP TURNING TO DEPTH 45 MM AND DIA 18 MM CHAMFERING
4		3-JAW CHUCK KNURLING TOOL 0.5 MM, RIGHT-HAND SIDE TOOL, CLAMPING BUSH, OIL CAN	TRUE SETTING WITH DEAD CENTRE KNURLING CHAMFERING

SCALE 1:1

MAT. of Ex.03

## KNURLED BOLT

NO. 1.0.4/0 4

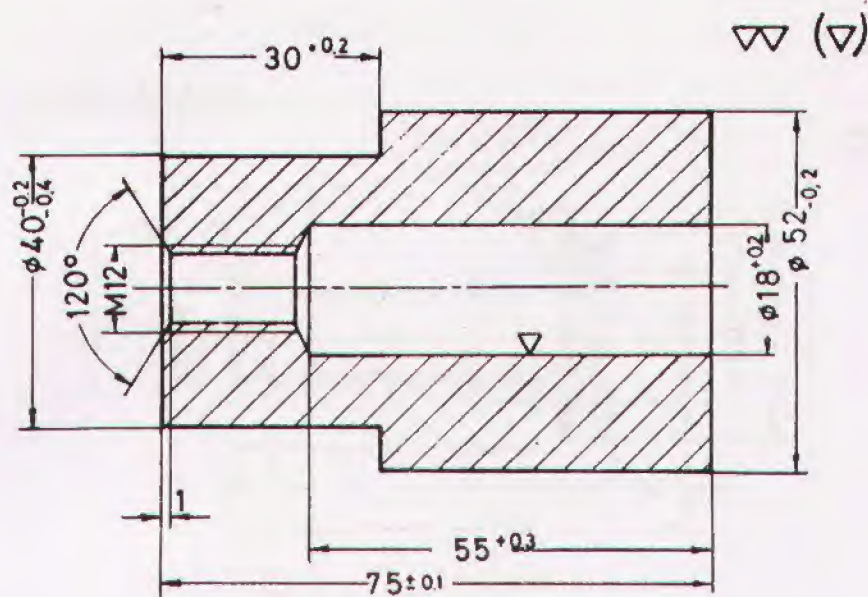
BASIC / TURNING



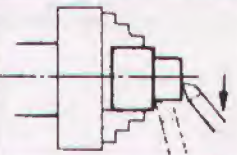
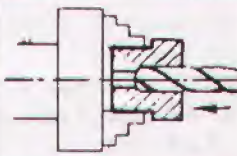
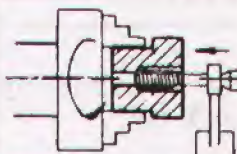
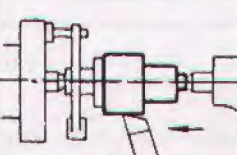
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PAK-GERMAN TECHNICAL TRAINING PROGRAMME





### SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		3-JAW CHUCK FACING TOOL RIGHT-HAND SIDE TOOL	FACING UP TO LENGTH 75 MM. RECESS TURNING UP TO DEPTH 30 MM AND DIA 40 MM
2		CENTRE DRILL 2.5 MM TWIST DRILL 10.2 MM TWIST DRILL 18 MM CLAMPING BUSH	CENTERING, SETTING DRILLING 10.2 MM DRILLING 18.0 MM
3		TAPS M 10 HANDLE	INSIDE THREAD CUTTING RESETTING, TRUE SETTING WITH DEAD CENTRE CHAMFERING
4		MANDREL RIGHT-HAND SIDE TOOL	TURNING OUTSIDE DIA 52 MM

SCALE 1:1

MAT. of Ex. 01

## THREAD BUSH

NO :- 1.0.4/05

BASIC / TURNING



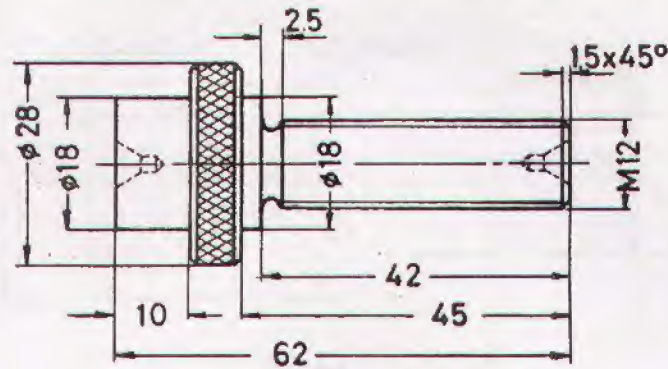
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TOLERANCE  $\pm 0.1$



### SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		DRIVING PLATE DOG CARRIER RIGHT-HAND SIDE TOOLS	RECESS TURNING UP TO DEPTH 10 MM AND DIA 18 MM CHAMFERING
2		RIGHT-HAND SIDE TOOLS CLAMPING BUSH	RESETTING RECESS TURNING UP TO DEPTH 42 MM AND DIA 12 - 1.5 MM CHAMFERING
3		FORMING TOOL R 2.5 MM	RELIEF TURNING UP TO DIA 9.5 MM
4		3-JAW CHUCK THREAD DIE M 12 CLAMPING BUSH	TRUE SETTING WITH DEAD CENTRE OUTSIDE THREAD CUTTING

SCALE 1 : 1

MAT. of Ex.04

SPINDLE

NO :- 1.0.4/06

BASIC / TURNING



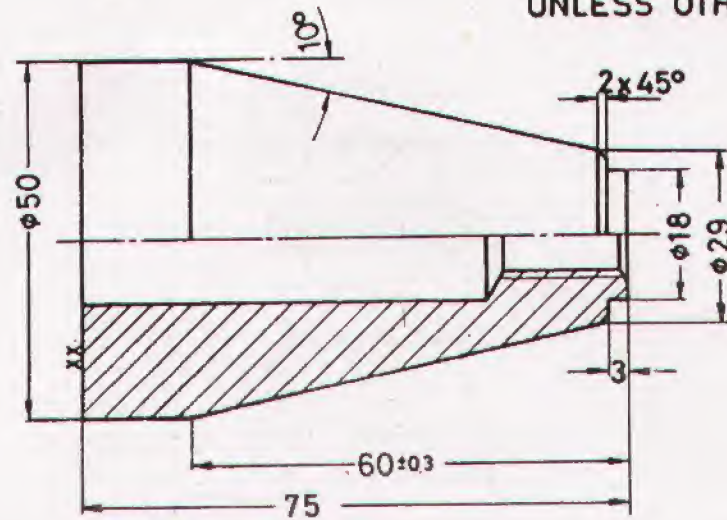
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TOLERANCE  $\pm 0.1$   
UNLESS OTHERWISE STATED



### SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		DRIVING PLATE DOG CARRIER FINISHING TOOL	FINISHING DIA 50 MM
2		RIGHT-HAND ROUGHING TOOL MANDREL	SETTING OF COMPOUND REST TO $10^\circ$ ROUGHING MIND FINISHING ALLOWANCE
3		FINISHING TOOL MANDREL	FINISHING OF TAPER
4		RIGHT-HAND SIDE TOOL MANDREL	RECESS TURNING UP TO DEPTH 3 MM AND DIA 18 MM CHAMFERING

SCALE 1:1

MAT. of Ex. 05

BASE STAND

NO :- 1.0.4/07

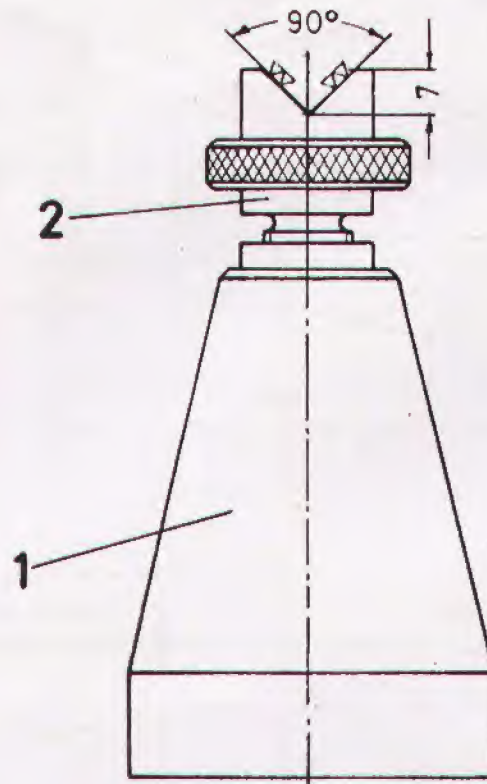
BASIC / TURNING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





# SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		MARKING TOOLS	MARKING
2		FILES SLOTTED NUT	FILING OF NOTCH
3			ASSEMBLING

2	1	SPINDLE	COMING FROM EX. 1.02/06
1	1	BASE STAND	" " EX. 1.02/07
P. No.	Qty.	Denomination	Remarks

SCALE 1 : 1

MAT.

## SCREW JACK

NO :- 1.0.4/08

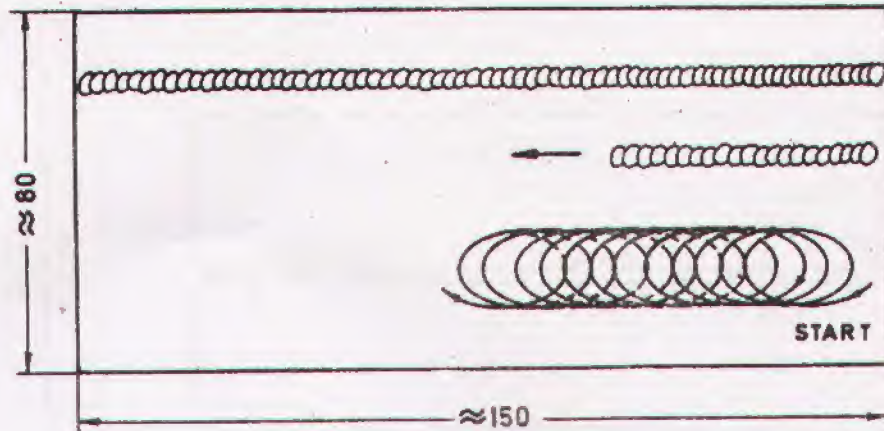
BASIC / TURNING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING




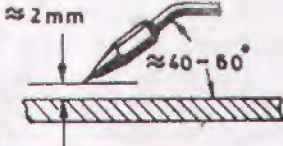
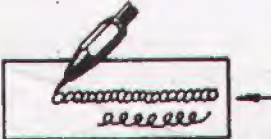
PAK-GERMAN TECHNICAL TRAINING PROGRAMME





Thickness 1mm  
(Sheet metal)

### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1	<p>A </p> <p>B </p> <p>C </p>	TORCH O, 5-1	<p>LIGHT THE TORCH AND ADJUST IT FOR A NEUTRAL FLAME</p> <p>A=NEUTRAL</p> <p>THE INNER CONE IS SHARP AND CLEAR VISIBLE.</p>
2			<p>KEEP THE TORCH IN A POSITION BETWEEN 40 - 60°.</p> <p>HOLD THE TIP OF THE CONE ≈ 2 MM ABOVE THE WORK.</p>
3			<p>MOVE THE TORCH CLOCKWISE. HOLD THE FLAME IN ONE SPOT UNTIL A PUDDLE OF METAL ≈ 4 - 6 φ IS FORMED.</p>

SCALE 1:1

MAT. MILD STEEL

BLIND BUTT WELD

No. MP1. /2.0.2 /1

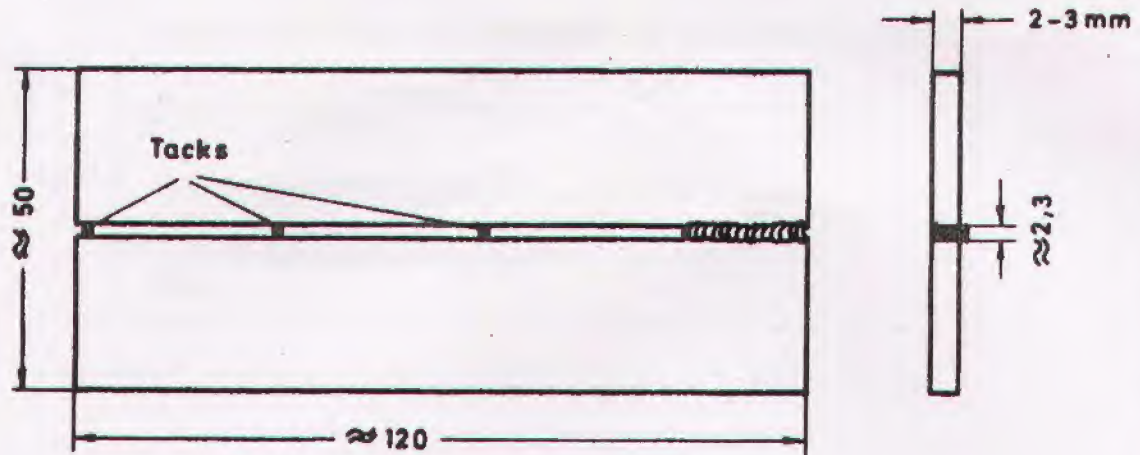
GAS WELDING I




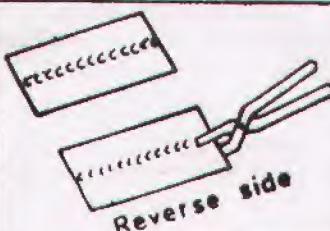
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		TORCH 2 - 4 ROD $\phi$ 2 - 2,5	MOVE THE ROD RHYTHMICALLY UP AND DOWN. DIP THE END INTO THE MOLTEN PUDDLE. TORCH MOVEMENT NEARLY ROTATING. ENSURE COORDINATION WITH ROD.
2			TRY TO MAKE AN EQUAL WELD-BED BY HEIGHT AND SIZE. INSPECT REVERSE-SIDE FOR GOOD PENETRATION.

SCALE 1:1

MAT. MILD STEEL

SQUARE BUTT WELD

No. MP1- /2.0.2/2

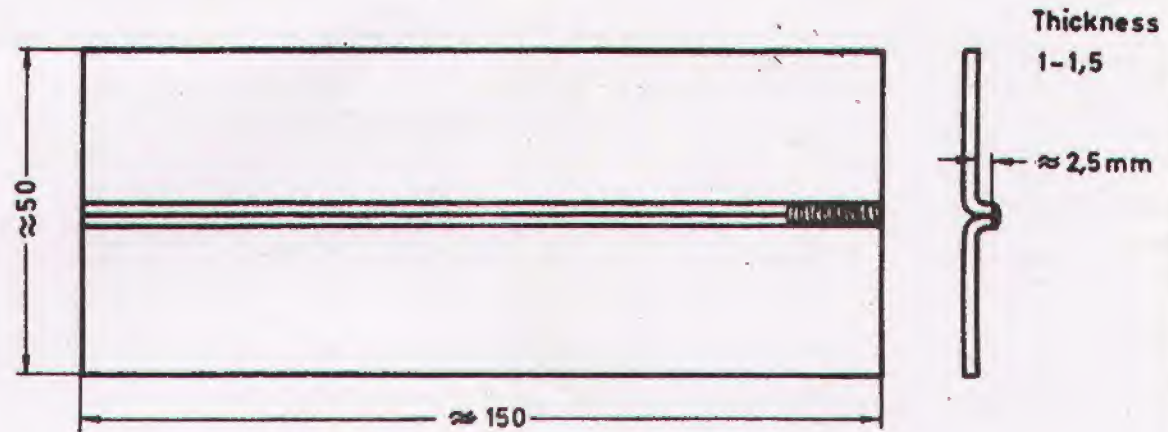
GAS WELDING I



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		TORCH 1 - 1,5	MAKE TACK-WELDS TO HOLD THE WORK IN PLACE DO IT CORRECTLY (HEAT WILL EXPAND THE MATERIAL)
2			MOVE THE TORCH CLOCKWISE. MELT THE FLANGE AND DISTRIBUTE IT WITH THE PRESSURE OF THE FLAME. PAY UTMOST ATTENTION TO CORRECT PENETRATION.

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SCALE 1:1

MAT. MILD STEEL

FLANGED BUTT WELD

No. MP 1. /2.0.2/3

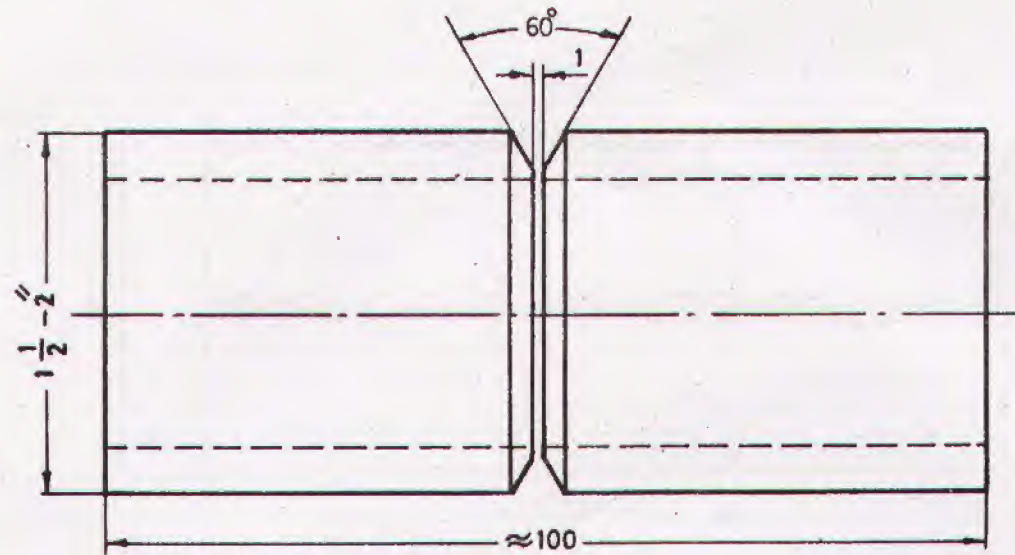
GAS WELDING I



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		TORCH 4 - 6 ROD 4 $\phi$	TACK WELDING. BRING THE TORCH IN A POSITION THAT THE FLAME WILL HEAT BOTH SIDES EQUALLY.
2			USE THE ROD TO STIR UP THE MOLTEN MATERIAL. ROD SHOULD BE MELTED ONLY IN THE MOLTEN MATERIAL OF THE WORKPIECE, EXCEPT WHEN STARTING.
3			ROTATE THE PIPE SECTION-WISE THAT YOU ARE ALWAYS IN A GOOD WELDING POSITION. INSPECT PIPE INSIDE.

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SCALE 1:1

MAT. MILD STEEL

PIPE BUTT WELD

No. MP 1. / 2.0.2 / 4

GAS WELDING I

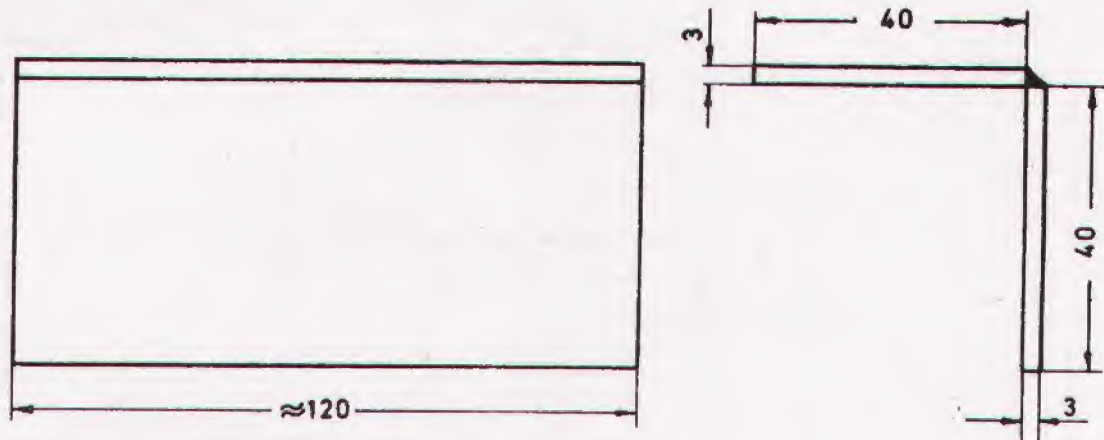


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



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No.	Symbol	Tools	Descriptions
1		TORCH 2 - 4	1) WELD THIS WITHOUT ROD (FLUSH WELDING) EXCESS EQUAL TO MATERIAL THICKNESS.
2		ROD 3 $\phi$	2) USE A ROD FILL UP THE ANGLE (CORNER). ENSURE THAT THE ROOT HAS BEEN MOLTEN.
3		ANVIL PLIER HAMMER	TEST THE WELD BY HAMMERING ON THE BEAD UNTIL THE PLATE LIES PERFECTLY FLAT. BREAK IT THEN.

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SCALE 1:1

MAT. MILD STEEL

CORNER WELD

No.MP 1. /2.0.2 /5

GAS WELDING I



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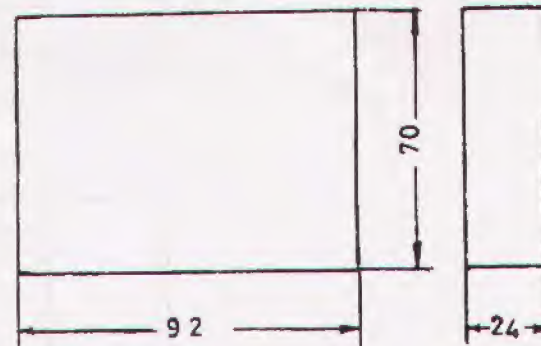
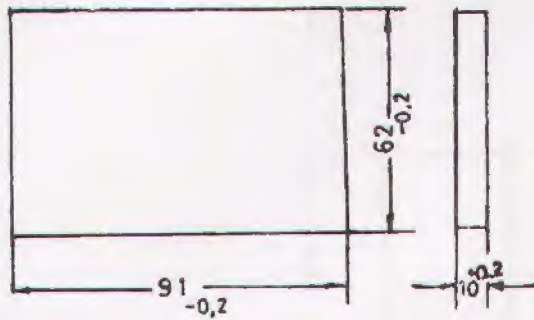




Tolerance  $\pm 0,1$   
unless otherwise stated

1

1a



MATERIAL may be taken from 3.3.1/6

### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		STRAIGHT LEFT-HAND CUTTING TOOL PARALLELS VERNIER CALIPER	SHAPING THE 4 SIDES SQUARE AND PARALLEL
2		STRAIGHT LEFT-HAND CUTTING TOOL PARALLELS DEPTH GAUGE	SHAPING BASE AND FACE
3		LEFT-HAND SIDE CUTTING TOOL TRY SQUARE	SQUARING-UP ENDS CHECK THE RIGHT ANGLE

Ex.1a- for MILL WRIGHT/ TURNING II

SCALE 1:1

MAT. MILD STEEL

**BASE PLATE**

(Ex.1-for Gauge)

NO. 2.3.3 / 1 - 1a

SHAPING I



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

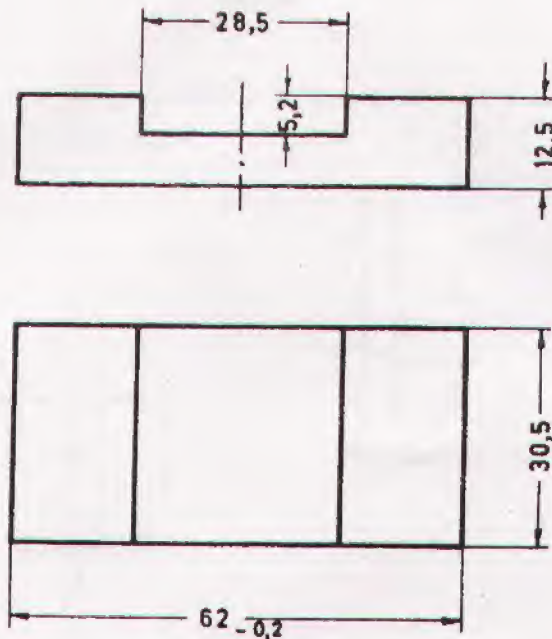
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MILL WRIGHT





Tolerance  $\pm 0,1$   
unless otherwise stated.



### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		STRAIGHT LEFT-HAND CUTTING TOOL PARALLELS VERNIER CALIPER	SHAPING THE 4 SIDES SQUARE AND PARALLEL
2		STRAIGHT LEFT-HAND CUTTING TOOL PARALLELS DEPTH GAUGE	SHAPING BASE AND FACE
3		GROOVING TOOL PARALLELS DEPTH GAUGE	GROOVING MAKE SURE THAT THE VICE IS FIXED IN CORRECT POSITION

SCALE 1:1

MAT. MILD STEEL

**SLIDE PLATE**

(For Gauge)

No. 2.3.3 / 2

SHAPING I



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

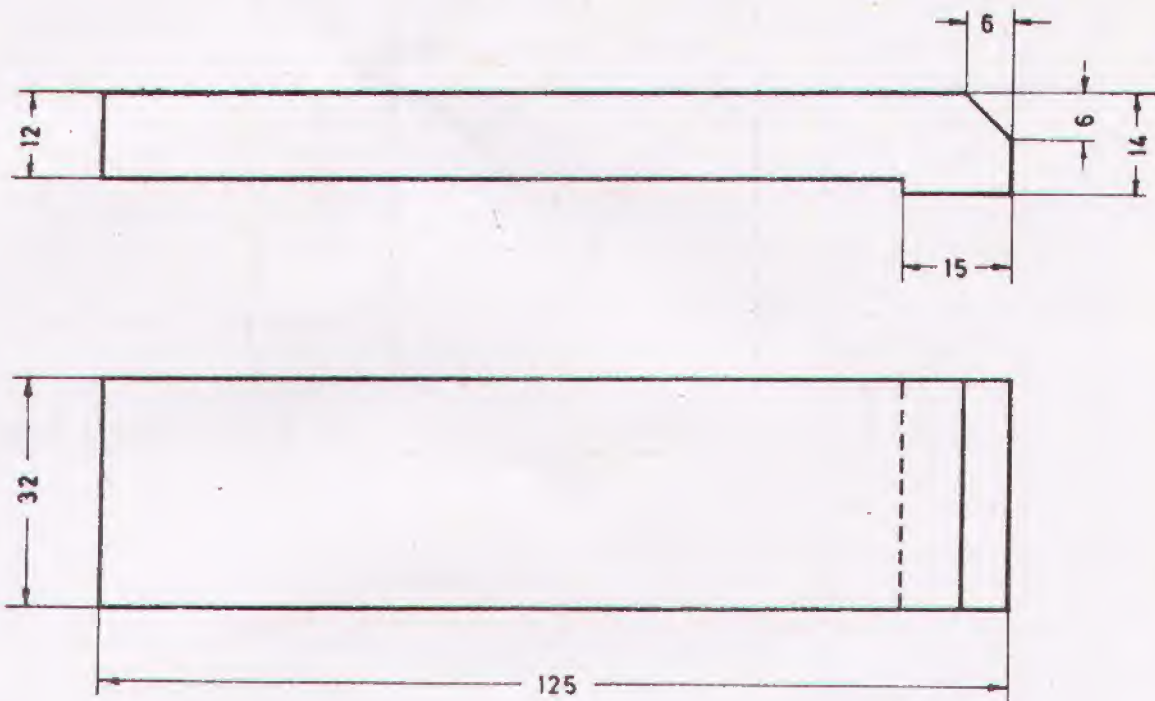
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MILLWRIGHT





Tolerance  $\pm 0,1$   
unless otherwise stated



### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		STRAIGHT LEFT-HAND CUTTING TOOL PARALLELS	SHAPING SQUARE AND PARALLEL THE 2 SIDES & THICKNESS 14 MM
2		LEFT-HAND SIDE CUTTING TOOLS PARALLELS TRY SQUARE	SQUARING-UP ENDS CHECK THE RIGHT ANGLE SHAPING OF THE STEP UP TO 12 MM THICKNESS
3		ROUGHING TOOL	CHAMFERING $45^\circ$ TURN THE TOOL THAT THE CUTTING EDGE COMES TO A $45^\circ$ POSITION

SCALE 1:1

MAT. MILD STEEL

### CLAMPING BAR

No. 2.3.3 / 3

SHAPING 1



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

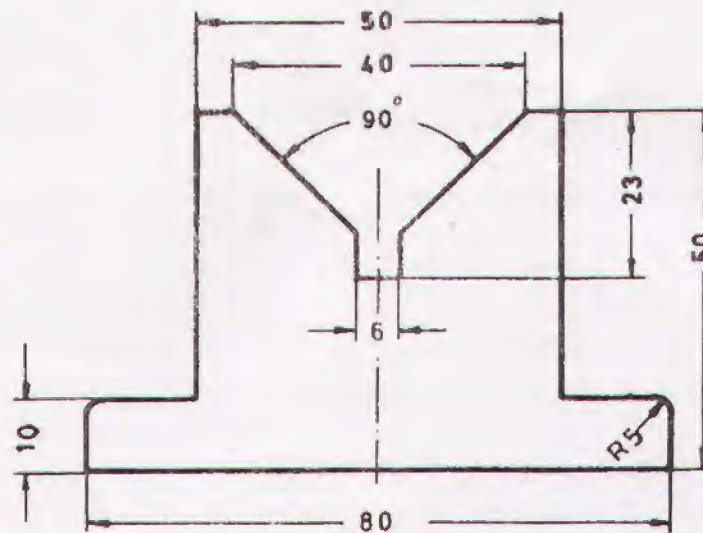
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MILLWRIGHT





Tolerance  $\pm 0,1$




Length = 100mm

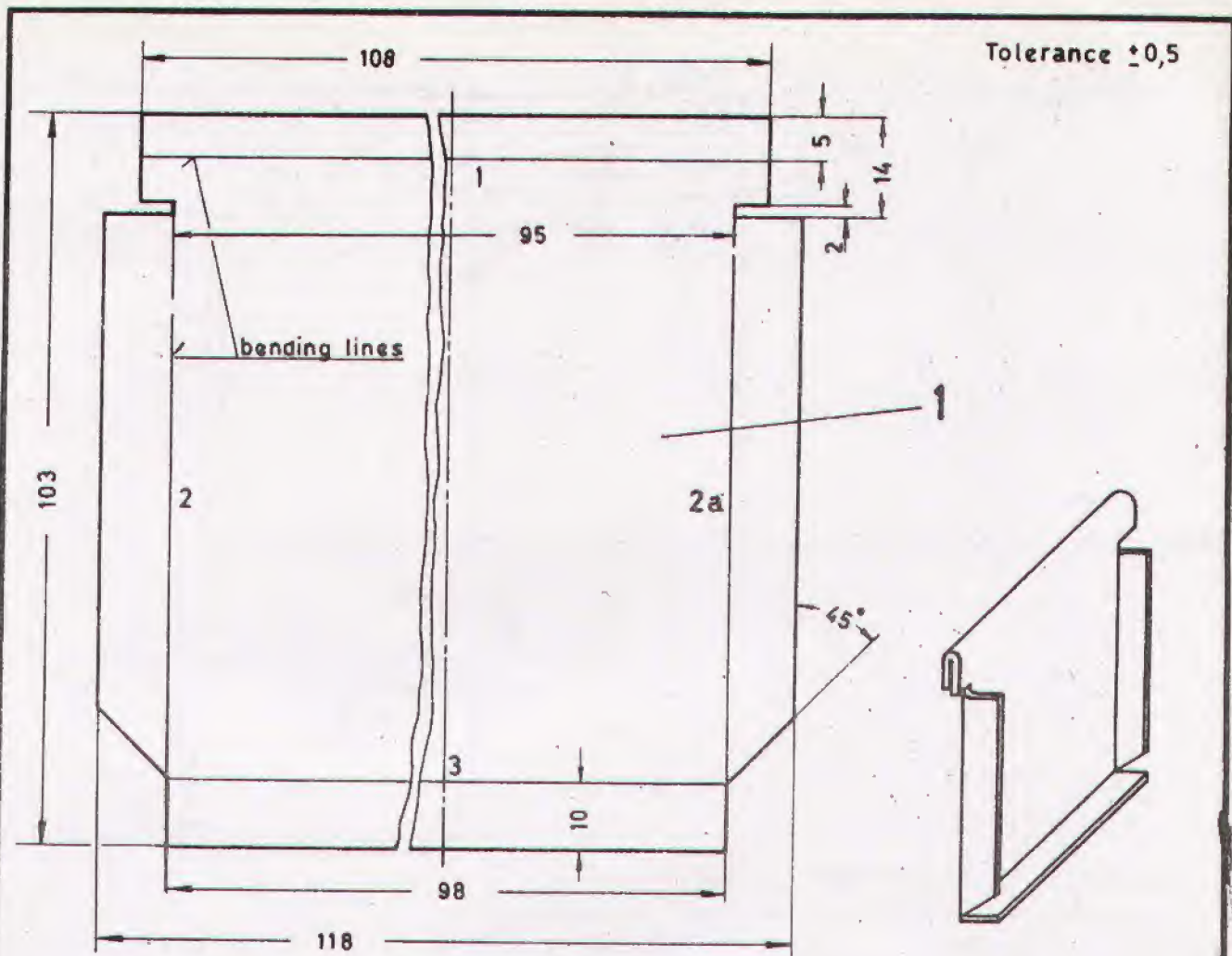
### SEQUENCE OF OPERATIONS

No	Symbol	Tools	Descriptions
1		LEFT HAND SIDE CUTTING TOOL	SHAPING OF BASE AND TOP SURFACES, SHAPING STEPS TAKING BASE AS REFERENCE SURF SQUARING UP ENDS
2		MARKING TOOLS ROUND-NOSE ROUGHING TOOL PARTING TOOL DEPTH GAUGE	MARKING ROUGHING THE V-GROOVE GROOVING WITH GROOVING TOOL
3		SIDE CUTTING TOOL BEVEL PROTRACTOR	SETTING THE TOOLHEAD TO 45° FINISHING THE V-GROOVE

Sketch No.2&3 are shown as Suggestion for Clamping  
The job may also be Clamped in a machine vice.

SCALE 1:1	V-BLOCK	No.2.3.3/4
MAT. CAST IRON		SHAPING I
 <div>DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING</div> <div>PAK-GERMAN TECHNICAL TRAINING PROGRAMME</div>		MILLWRIGHT





### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		MARKING TOOLS SHEARING MACHINE HAND SHEARS	MARK THE SHEET (LINE "1" AT THE BACKSIDE) CUT THE OUTER LINES ON THE SHEARING MACHINE & THE CORNERS WITH THE HELP OF HAND SHEARS.
2		BENDING MACHINE	FOLD THE SHEET AT LINE "1"
3		BENDING MACHINE TRY SQUARE	BEND THE SHEET AT LINES 2, 2a AND 3 TO THE OPPOSITE SIDE OF THE SEAM

SCALE 1:1

MAT. MS-SHEET

BACK PART OF STORE BOX

No. 2.3.5 / 1.1

FITTING II

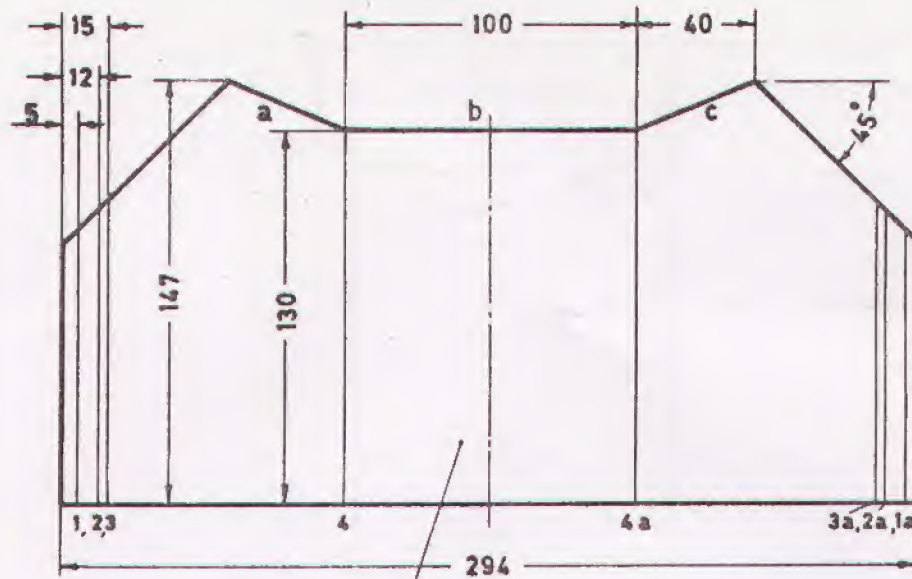


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

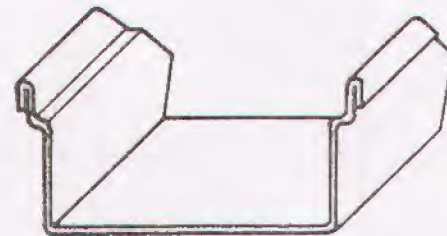
PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance  $\pm 0,5$



2



### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		MARKING TOOLS FLAT CHISEL SHEARING MACHINE	MARK THE SHEET (LINES 1 AND 3 ON THE BACKSIDE). CUT TO DIMENSION 294 X 147 AND ANGLES 45° ON THE SHEARING MACHINE. CUT AT THE LINES a,b,c WITH THE HELP OF A CHI- SEL. FOLD THE SHEET AT LINES 1.
2		BENDING MACHINE BENDING DIE TRY SQUARE	BEND AT LINES 2 AND 3 AS SHOWN IN THE SKETCH. USE A BENDING DIE.
3		BENDING MACHINE TRY SQUARE	BEND AT LINES 4.

SCALE 1:25

MAT. MS-SHEET

MAIN BODY OF STORE BOX

No. 2.3.5 /1.2

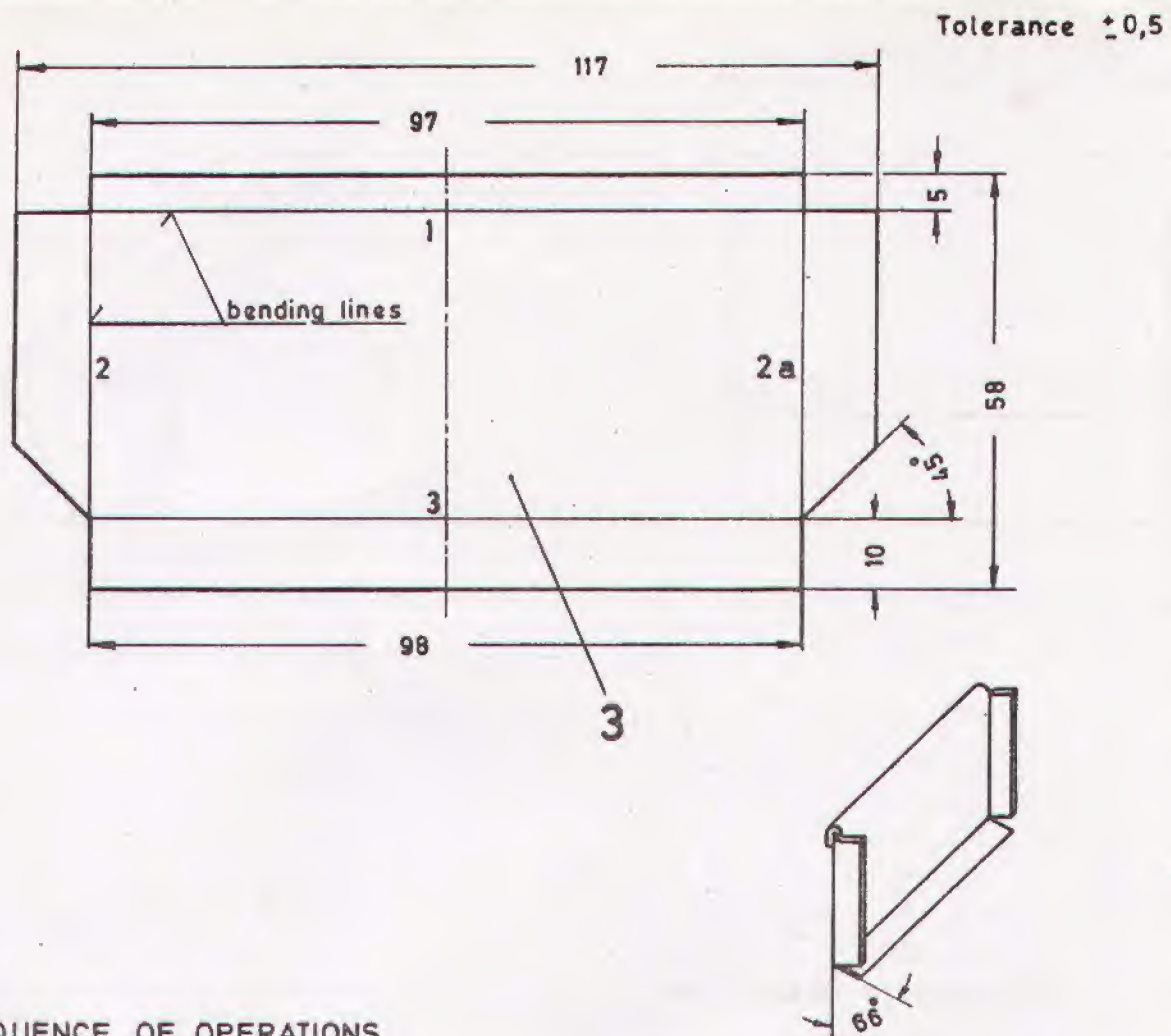
FITTING II



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		MARKING TOOLS SHEARING MACHINE HAND SHEARS	MARK THE SHEET (LINE "1" AT THE BACKSIDE) CUT THE OUTER LINES ON THE SHEARING MACHINE & THE CORNERS WITH THE HELP OF HAND SHEARS.
2		BENDING MACHINE	FOLD THE SHEET AT LINE "1"
3		BENDING MACHINE ANGLE PROTRACTOR	BEND THE SHEET AT LINES 2 AND 2a BEND AT LINE 3 MIND THE ANGLE

SCALE 1:1

MAT. MS - SHEET

FRONT PART OF STORE BOX

No. 2.3.5 /1.3

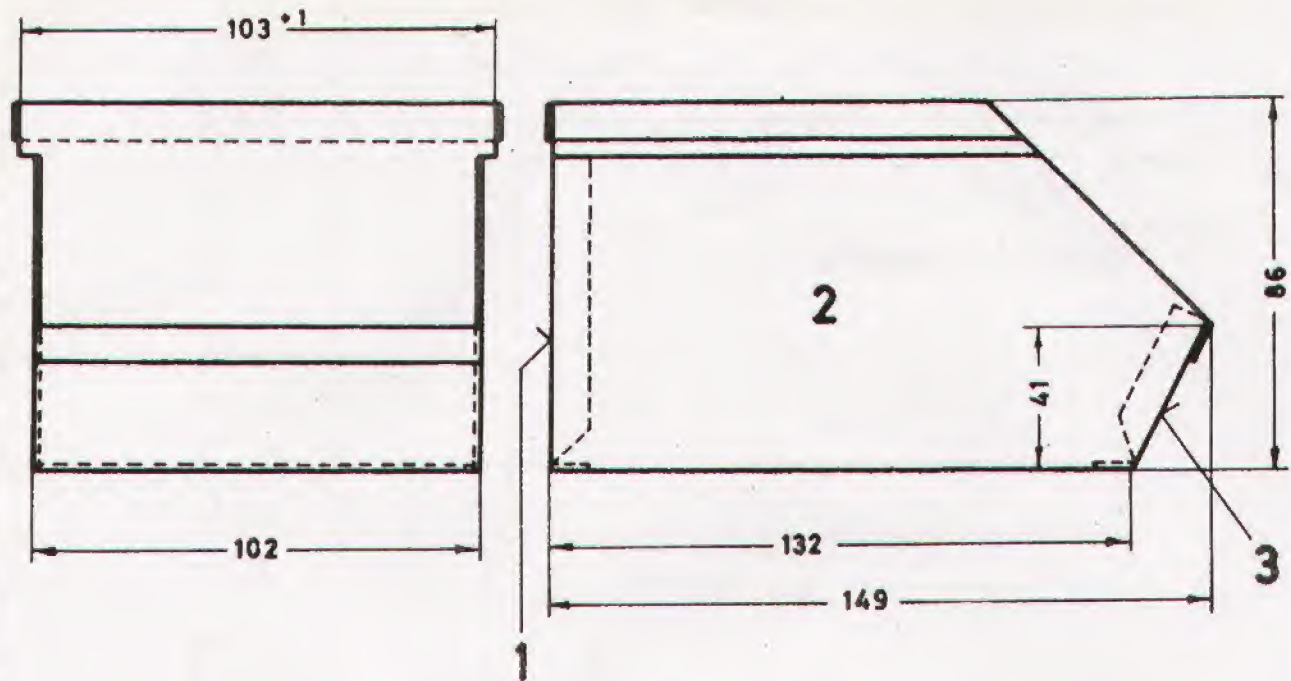
FITTING II



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





#### SEQUENCE OF OPERATION

1. REMOVE THE OXIDE LAYER FROM THE SPOTWELDING AREAS.
2. FIT PART NO. 1 AND 3 INTO PART NO. 2.
3. SPOTWELD THE BOX.  
DISTANCE OF THE SPOTS 15 MM.
4. TACKWELD THE CORNERS AND FINISH BY FILING.

1	FRONT	3	MILD STEEL SHEET 22 SWG
1	MAIN BODY	2	MILD STEEL SHEET 22 SWG
1	BACK	1	MILD STEEL SHEET 22 SWG
QTY.	DENOMINATION	P No.	MATERIAL - REMARKS

	STORE BOX		No. 2.3.5 /1- 4
MAT. MS-SHEET			FITTING II

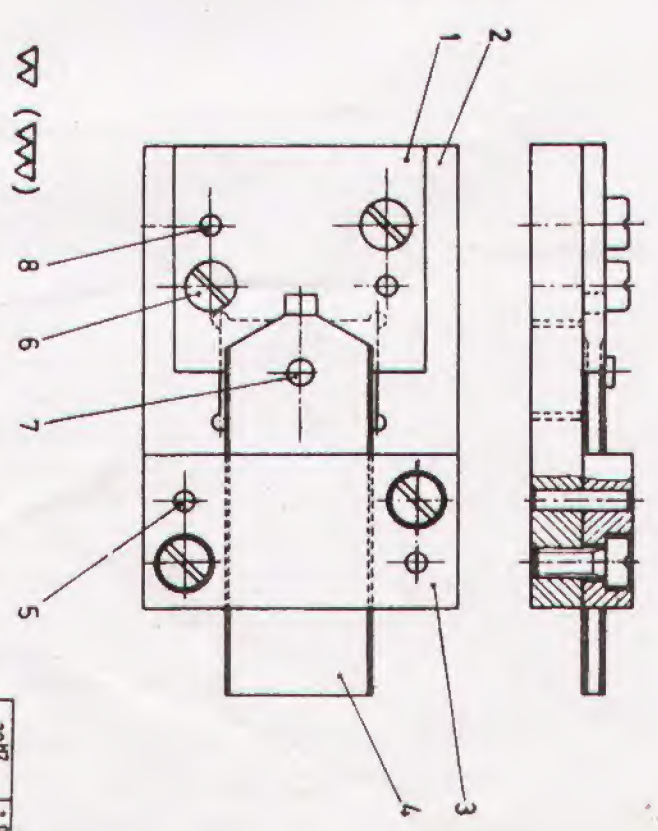
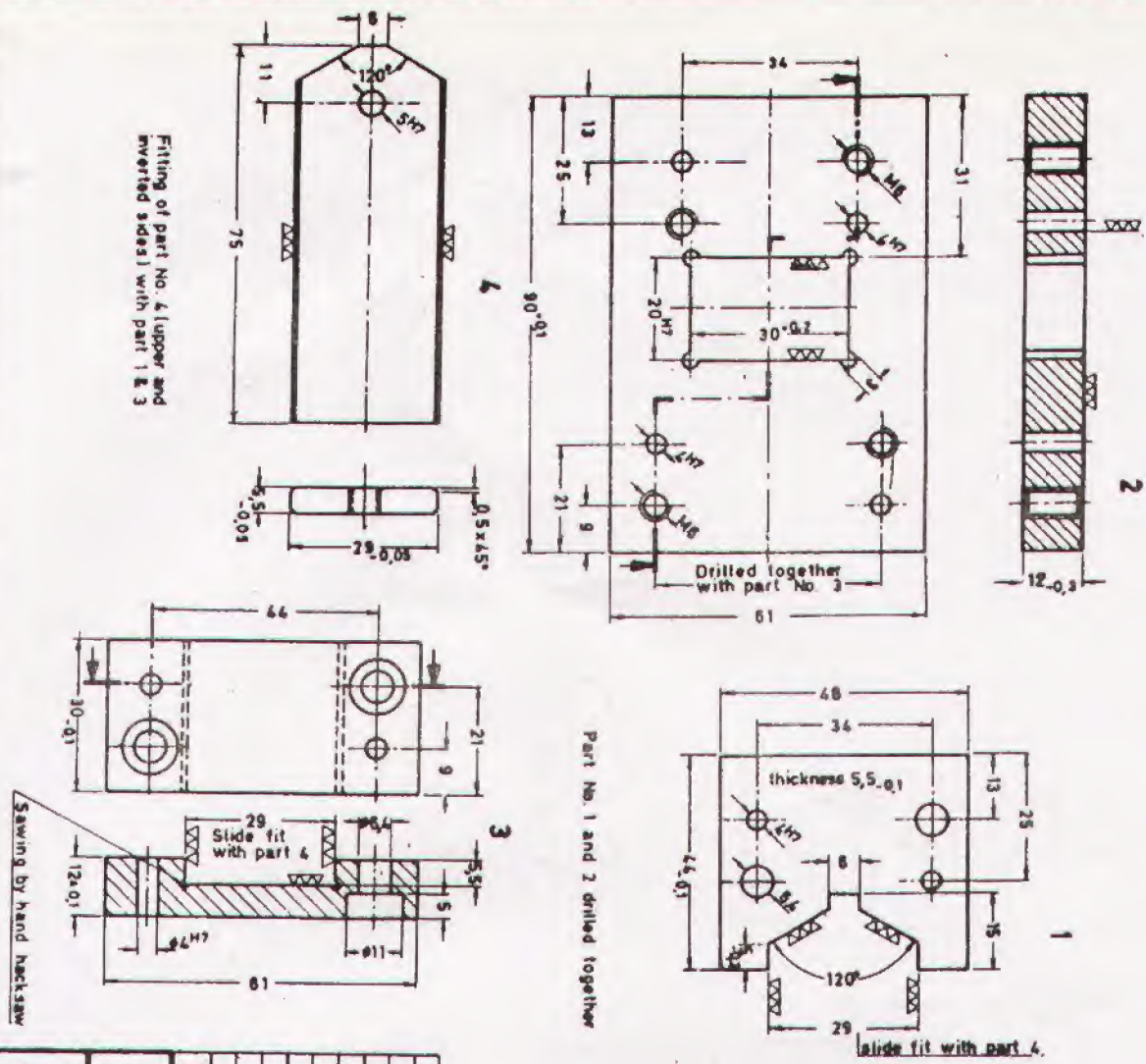


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance  $\pm 0.1$   
Unless otherwise stated



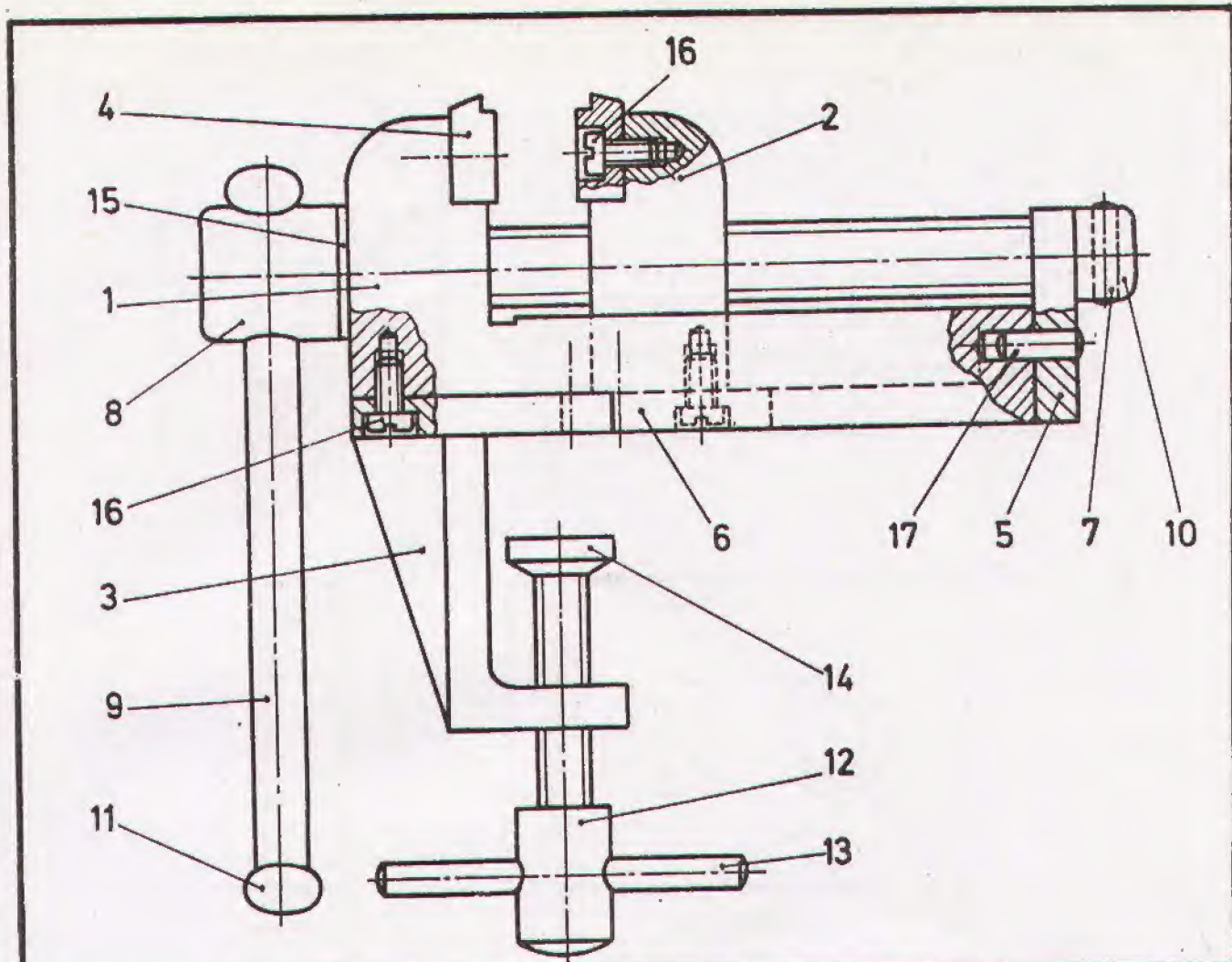
Prorated time... 1.3 hrs.

Qty.	Denomination	Part No.	Material / Remarks
2	Cylindrical pin	8	$\phi 4.6 \times 15$
1	Cylindrical pin	7	$\phi 5.6 \times 5$
4	Cheese-head screw	6	M5x15
2	Cylindrical pin	5	$\phi 4.6 \times 20$
1	Sliding part	4	Mild steel 32x5x7.6
1	Slide plate (Bridge)	3	Mild steel From MILLWRIGHT 2.3.7/2
1	Base plate	2	Mild steel From MILLWRIGHT 2.3.7/1
1	Stop	1	Mild steel 50x5x4.5

SCALE 1 : 1	GAUGE	NO. 2 3 5 / 2
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING		FITTING 11
PAR GERMAN TECHNICAL TRAINING PROGRAMME		MILL WRIGHT





2	STRAIGHT PIN	17	4m6x12 mm
12	CHEESE HEAD SCREW	16	M5 x 10
1	WASHER	15	BRASS $\phi 25 \times 3$
1	CLAMPING WASHER	14	MILD STEEL $\phi 20 \times 10$ mm
1	STRAIGHT PIN	13	$\phi 6 \times 55$ mm
1	CLAMPING SCREW	12	$\phi 16 \times 68$ mm
2	HANDLE HEAD	11	FROM MACHINIST 2,2,3 / 1
1	BUSH	10	2,2,3 / 2
1	HANDLE	9	2,2,3 / 1
1	SPINDLE	8	2,2,3 / 2
1	STRAIGHT PIN	7	4m6 x 14 mm
1	GUIDE PLATE	5	MILD STEEL 25 x 8 x 33
1	SPINDLE GUIDE	5	FROM MACHINIST 2.2.2 / 1
2	JAW	4	FROM MACHINIST 2,2,2 / 2
1	CLAMPING PIECE	3	2,2,4 / 8
1	MOVEABLE JAW	2	2,2,4 / 5
1	FIXED JAW	1	2,2,4 / 4

QTY.	DENOMINATION	P.No.	REMARKS
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SCALE 1:1

BENCH VICE

No. 2.3.5/3 (I)

FITTING II

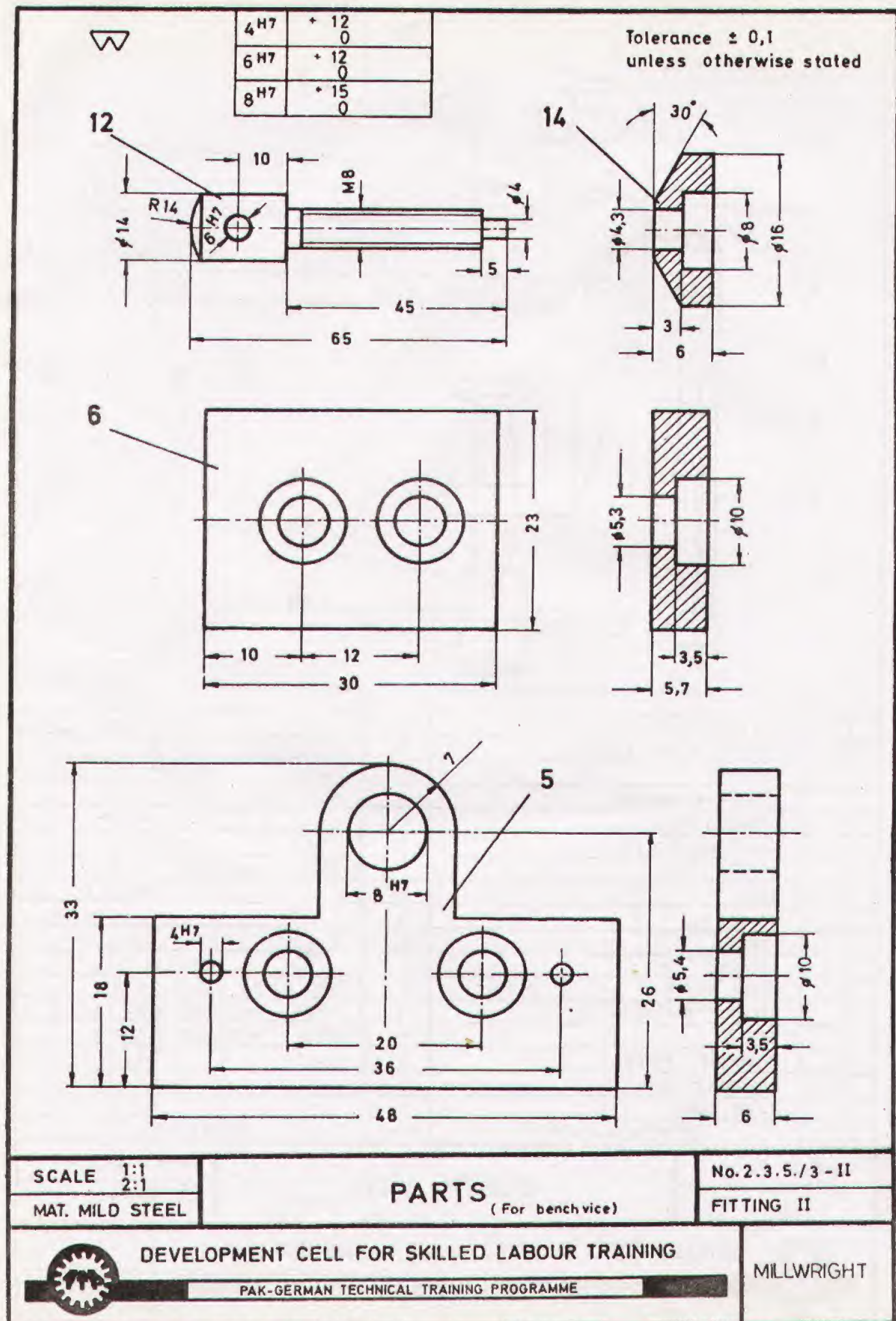


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MILLWRIGHT

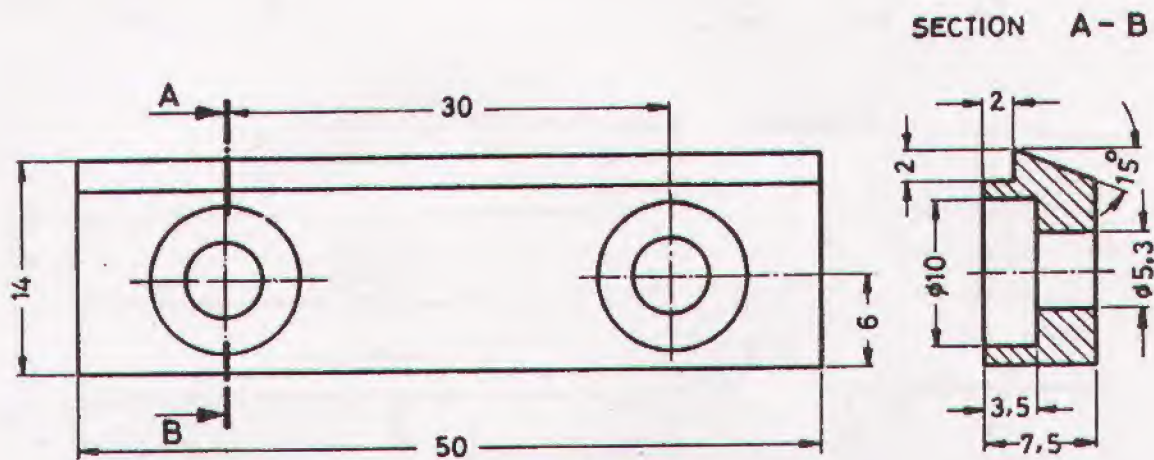






4  $\nabla \nabla$

Tolerance  $\pm 0,1$   
unless otherwise stated



Drill together with part No. 1 & 2.

SCALE 2 : 1

**JAW**

From Machinist / Shaping II (For bench vice)

No. 2.3.5 / 3 - III

FITTING II

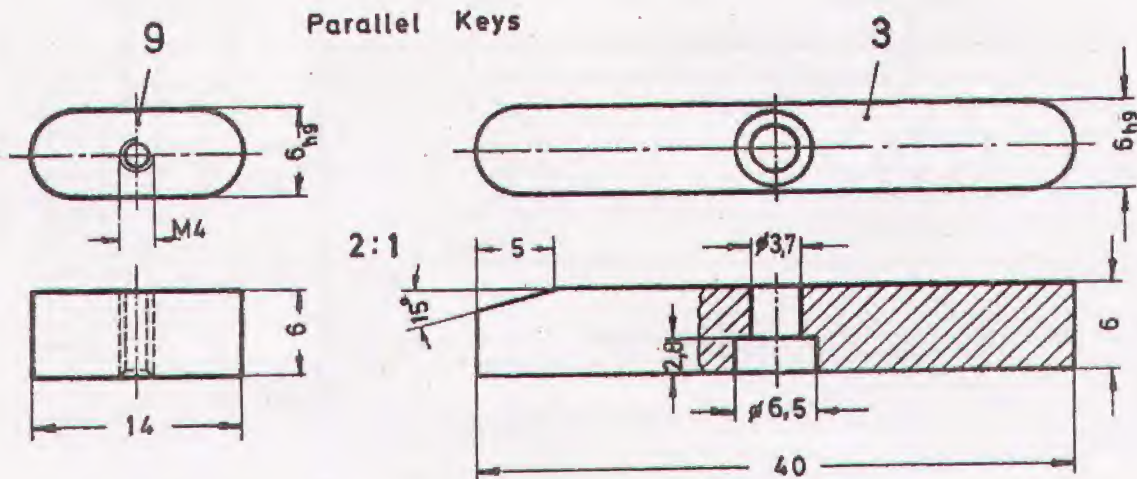
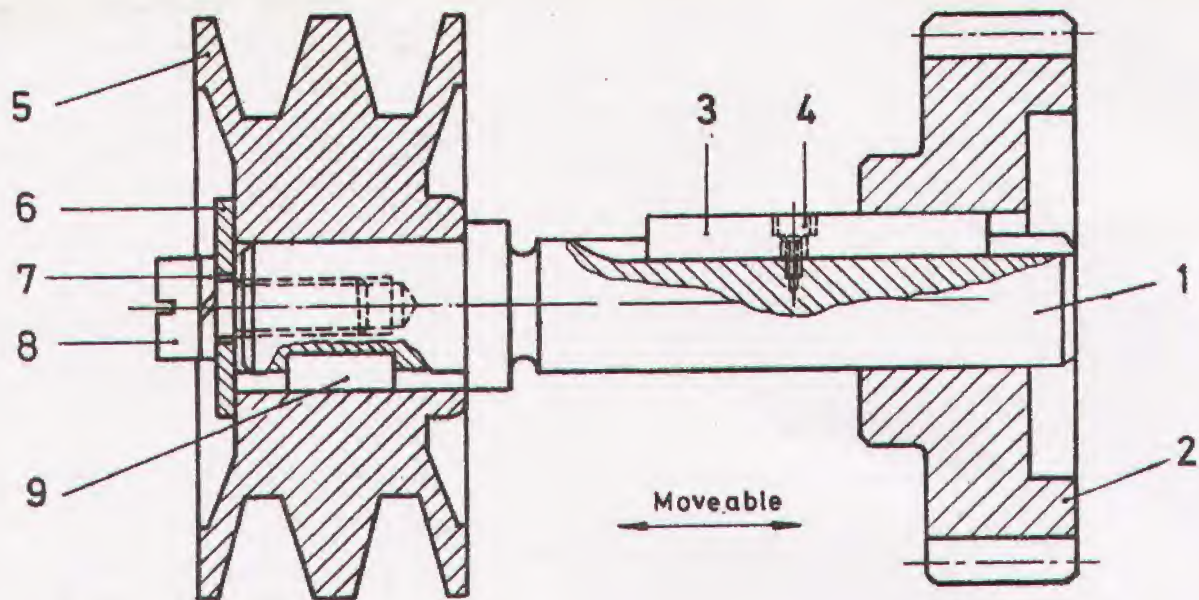


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MILLWRIGHT





6h9 0  
-30

1	Parallel key	9	G/6x6x14
1	Screw cylindrical head	8	M8x20
1	Spring washer	7	ø 8,5
1	Washer	6	ø 8,5x2
1	Pulley	5	from Turner 2.1.2/6
1	Screw cylindrical head	4	M3x8
1	Parallel key	3	C/6x6x40
1	Gear	2	from Mach. 2.2.4/11
1	Shaft	1	from Mach 2.2.4/7
Qty	Denomination	P. No.	Remarks

SCALE 1:1  
2:1

## SHAFT WITH PULLEY AND GEAR

No. 2.3.5/4

FITTING II


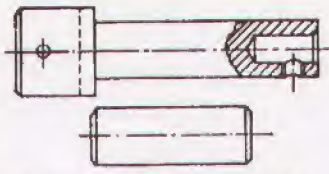


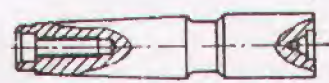
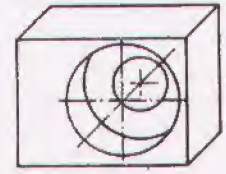
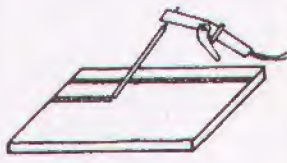
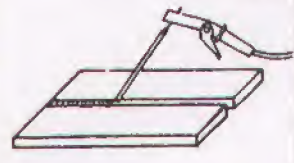
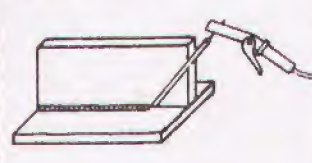
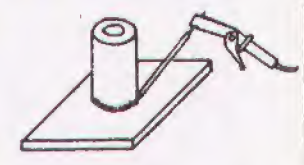
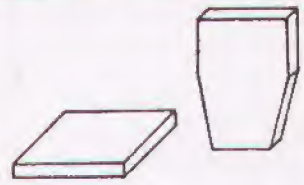
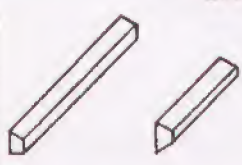
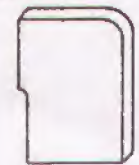

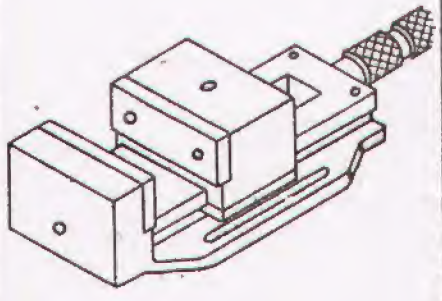
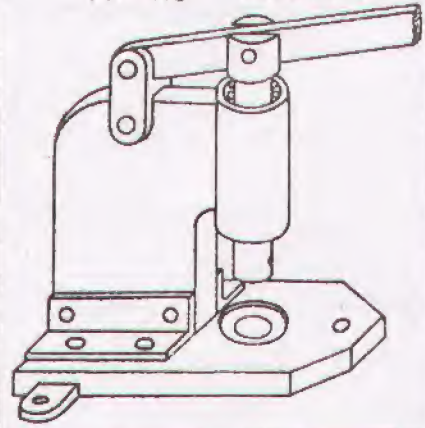
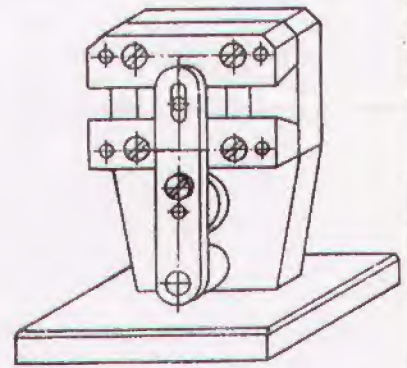


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MILLWRIGHT



TURNING 3.3.1 / 1-6			
			
Longitudinal turning, Knurling Thread cutting 1 → 3.3.4/3	Longitudinal turning, Drilling 2 → 3.3.4/2	Knurling, Thread cutting 3 → 3.4.4/1	
			
Form turning 4	Taper turning 5 → 3.2.2/ 8	Work with 4 jaw independent chuck 6	
WELDING 3.3.2/1-4			
			
Blind welding 1	Butt welding 2	Fillet welding 3	Tube and plate welding 4
SHAPING 3.3.3/1-4			
			
Parallel & angle shaping 1 → 3.3.4/3	Angle shaping 2 → 3.3.4/3	Form shaping 3 → 3.3.4/2	Parallel & angle shaping 4 → 3.3.4/2
FITTING 3.3.4/1-3			
			
1	2	3	
TRADE TRAINING	LAYOUT		No. 3.3.1 No. 3.3.2 No. 3.3.3 No. 3.3.4
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME			MILLWRIGHT



## MATERIAL REQUIRED

Trade Training for millwright

Exercise No. (Length given in millimeter)

Turning No. 3.3.1	1	2	3	4	5	6	Length per trainee	Total length for a batch of 16 trainees
M/S Round 25mm (1")	60	130					190 mm	3,2 meter
M/S Round 30 mm (1 1/8")		65					65 mm	1,1 meter
M/S Round 15 mm (5/8")		30	115				145 mm	2,4 meter
M/S Round 12 mm (1/2")			70				70 mm	1,2 meter
M/S Round 75 mm (3")				35			35 mm	0,6 meter
High speed steel Round 20 mm (3/4")					125		125 mm	2,1 meter
Cast iron 76 x 28 (3 x 1 1/8") according pattern						100	100 mm	1,9 meter

Arc welding No. 3.3.2	1	2	3	4	Length per trainee	Total length for a batch of 16 trainees
M/S Sheet 5mm (3/16")	120 x 75				120 x 75 mm	0,2 meter <sup>2</sup>
M/S Flat 25 x 4 (1" x 3/16")		250			250 mm	4,0 meter
M/S FLAT 50 x 6 (2" x 1/4")			250		250 mm	4,0 meter
M/S PIPE Ø 35 (1 1/2")				70	70 mm	1,2 meter
M/S Flat 75 x 6 (3" x 1/4")				75	75 mm	1,5 meter
M/S Sheet 32 x 3 (1 1/4" x 1/8")				150	150 mm	2,5 meter

Contd: back page



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MILLWRIGHT



# MATERIAL REQUIRED

Trade Training for millwright

Exercise No. (Length given in millimeter)

Shaping No. 3.3.3	1	2	3	4	Length per trainee	Total length for a batch of 16 trainees
M/S Flat 65 x 12 (2 1/2 x 1 1/2)	150				150 mm	2,5 meter
M/S Square 16 x 16 (5/8 x 5/8)		130			130 mm	2,2 meter
M/S Flat 65 x 12 (3 x 1 1/2)		25			25 mm	0,4 meter
M/S Flat 75 x 12 (3 x 1 1/2)			110		110 mm	1,9 meter
M/S Flat 75 x 12 (3 x 1 1/2)				120	120 mm	1,5 meter

Fitting No. 3.3.4	1	2	2.1	3	Length per trainee	Total length for a batch of 16 trainees
M/S Round Part.No. 13 25 mm (1)	15				15 mm	0,3 meter
Low Carbon steel Round 10 mm (3/8) Part.No. 7		30			30 mm	0,6 meter
Angle iron Part.No. 4 25 x 25 mm (1 x 1)			140		140 mm	2,3 meter
M/S Round Part.No. 9 & 10 20 mm (3/4)				30	30 mm	0,6 meter
M/S Flat 5/8 x 1 1/4 Part.No. 6				85	85 mm	1,5 meter

All other materials as screws, washers and pins for the Fitting course should be supplied according to drawing

For details please see Layout



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

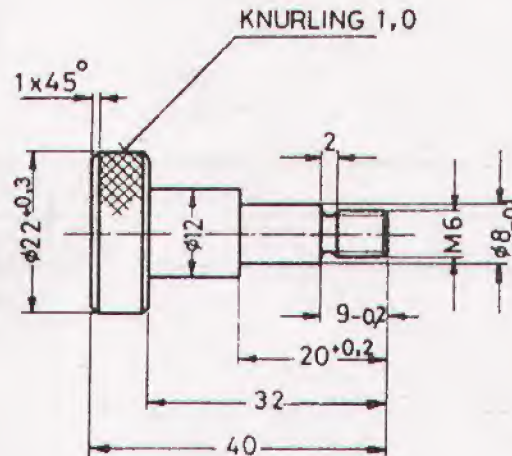
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MILLWRIGHT

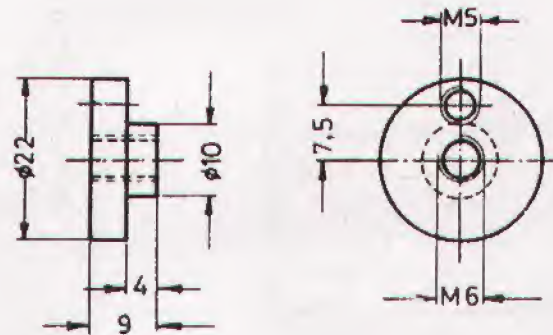




Tolerance  $\pm 0.1$   
unless otherwise stated

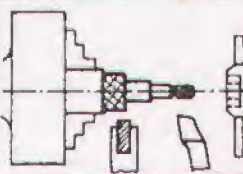



8



7

### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		R.-HAND SIDE CUTTING TOOL, DRILL $\phi 4.8$ KNURLING TOOL 1 MM TAPS AND DIE M6 PARTING TOOL	FACING AND LONGITUDINAL TURNING KNURLING THREAD CUTTING, PARTING
2		RIGHT-HAND SIDE CUTTING TOOL ROUGHING TOOL	CLAMPING IN COLLET CHUCK FACING TO THE LENGTH CHAMFERING

SCALE 1:1

KNURLING BOLT & NUT

No. 3.3.1/1

MAT. MILD STEEL

(For rocker arm)

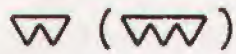
TURNING II



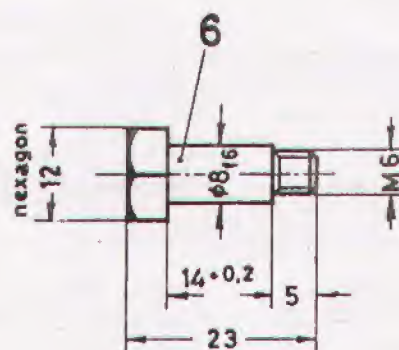
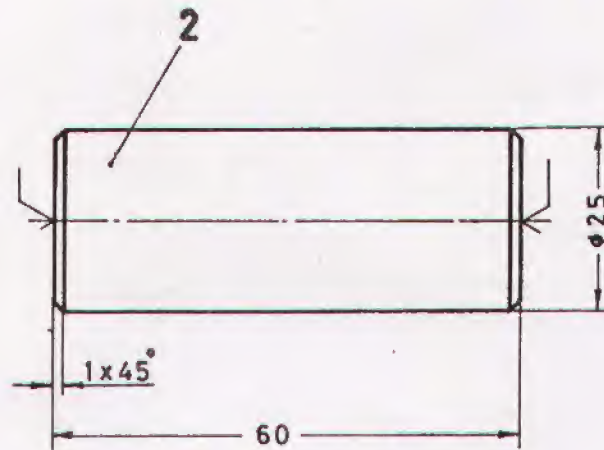
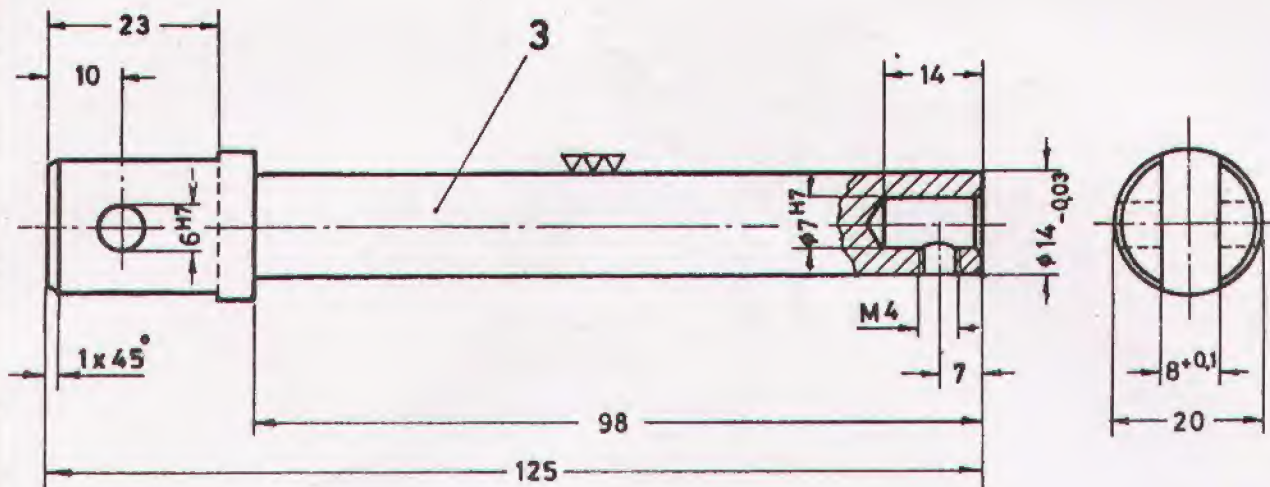
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





Tolerance  $\pm 0,1$   
unless otherwise stated



6	H7	$+0,012$ 0
7	H7	$+0,015$ 0
8 f6		$-0,013$ $-0,022$

SCALE 1:1

MAT. MILD STEEL

**SPINDLE , GUIDE BUSH & STEP BOLT**  
(For lever press)

No. 3.3.1 / 2

TURNING II



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

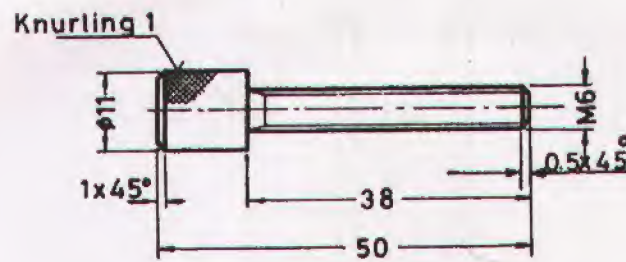
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MILLWRIGHT

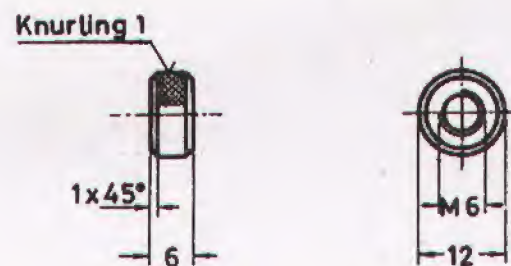




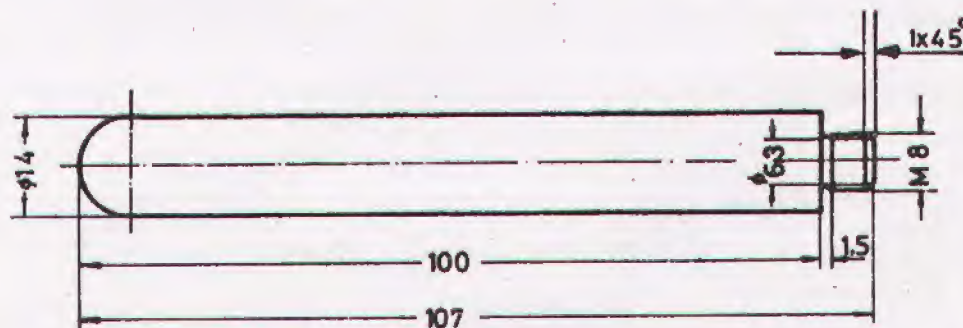
Tolerance  $\pm 0,1\text{mm}$   
unless otherwise stated.



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10



7

SCALE 1:1

MAT. MILD STEEL

ADJUSTING SCREW & LEVER

(For tool post)

No. 3.3.1 / 3

TURNING II



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

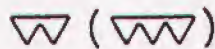
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MILLWRIGHT

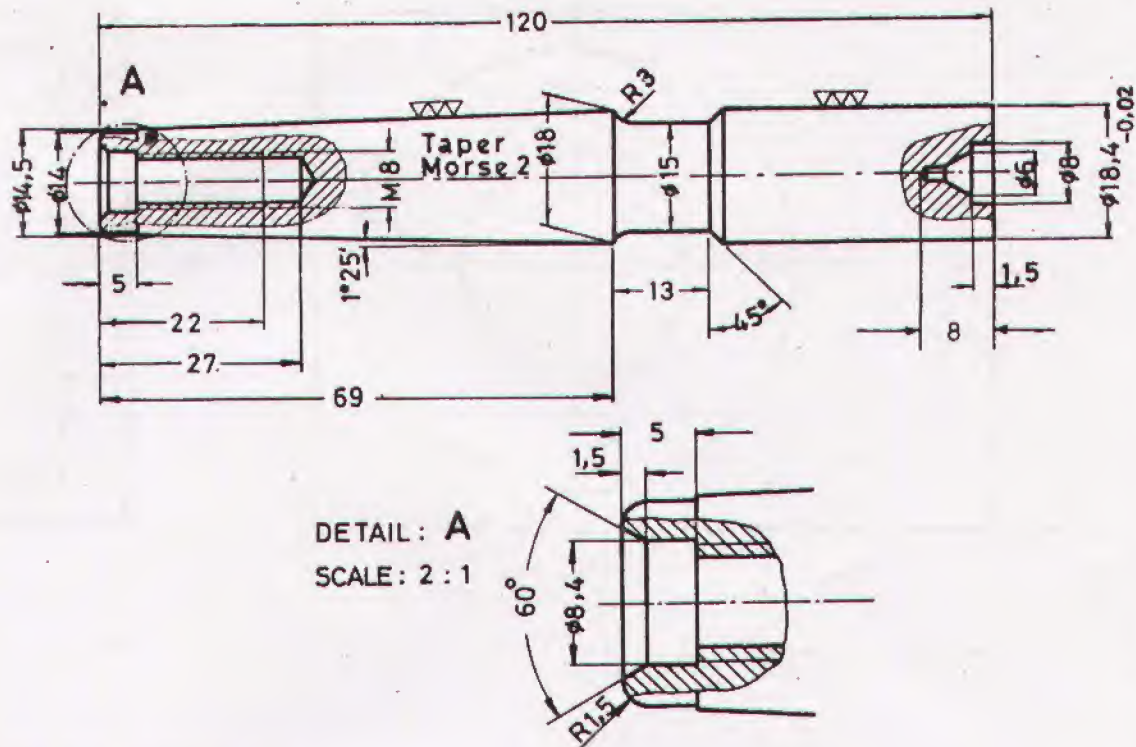








Tolerance  $\pm 0,1$  mm  
unless otherwise stated.



### SEQUENCE OF OPERATION

No.	Symbol	Tools	Description
1		R.-HAND FACING TOOL CENTRE DRILL, TWIST DRILL $\phi 6.5$ AND $\phi 8$ . TAP M8. R.-HAND ROUGHING TOOL. ROUND NOSE FINISH- ING TOOL.	FACING, CENTERING, DRILLING AND THREAD CUTTING. SETTING OF THE LATHE CENTRE LONGITUDINAL TURNING. SETTING OF THE COMPOUND REST AT THE REQUIRED ANGLE. TAPER TURNING.
2		TAPER RING GAUGE MORSE NO. 2	CHECKING OF THE TAPER WITH TAPER RING GAUGE
3		RIGHT-HAND FACING TOOL NECKING TOOL MICROMETER CENTRE DRILL BORING TOOL	HOLDING THE WORKPIECE IN THE HEADSTOCK SPINDLE BY USING A TAPER SLEEVE. FACING, LONGITUDINAL TURN- ING NECKING, CENTERING.

SCALE 1:1

MAT. H. S. STEEL

### TAPER SHANK END MILL

No. 3.3.1/5

TURNING II

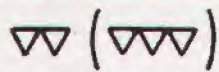


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

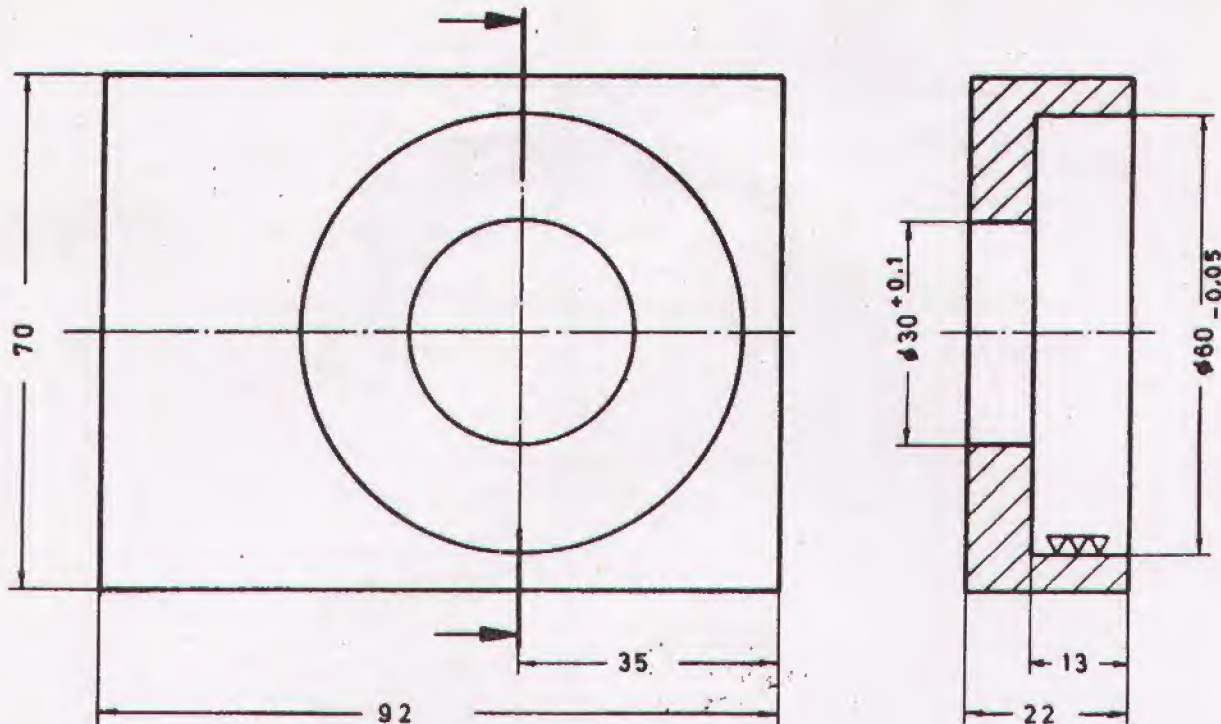
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MILLWRIGHT





Tolerance  $\pm 0.1$   
unless otherwise stated.



### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Description
1		4-JAW INDEPENDENT CHUCK SURFACE GAUGE INSIDE CALIPER	CLAMPING OF A RECTANGULAR PLATE AND TRUING UP
2		RIGHT HAND ROUGHING AND FACING TOOL CENTRE DRILL, TWIST DRILL, BORING TOOL INTERNAL MICROMETER	FACING, CENTERING, DRILLING, BORING INTERNAL MEASURING WITH MICROMETER
3		RIGHT HAND ROUGHING AND FACING TOOL (CARBIDE-TIPPED)	RECLAMPING OF THE WORKPIECE, TRUING UP FACING

SCALE 1:1

MAT: CAST IRON

### ECCENTRIC BORING PLATE

From Shap. I-2.3.3/1a

No. 3.3.1/ 6

TURNING II

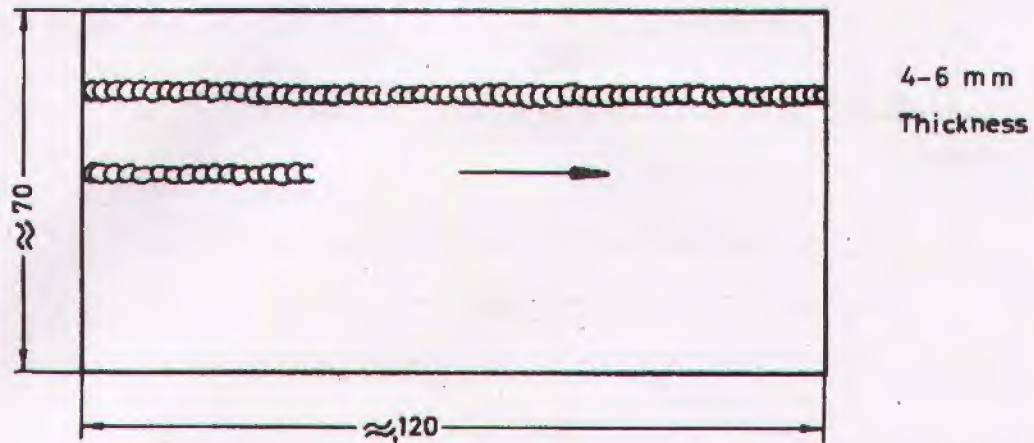


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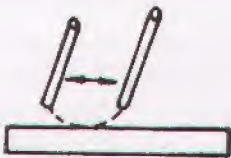
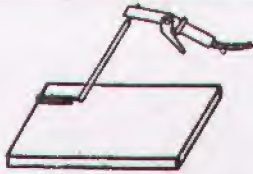
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MILLWRIGHT





### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		ELECTRODE 3.25 mm	STRIKE AN ARC AND RUN A CONTINUOUS BEAD (WELD) FROM LEFT TO RIGHT END. A PREFERRED METHOD OF STRIKING FOR BEGINNERS IS SHOWN LEFT.
2			KEEP THE DISTANCE BETWEEN ELECTRODE AND MATERIAL CONTINUOUSLY EQUAL. OTHERWISE THE ARC FINISHES.

SCALE 1:1

MAT. MILD STEEL

BLIND WELD

No 3.3.2/1

ARC WELDING I

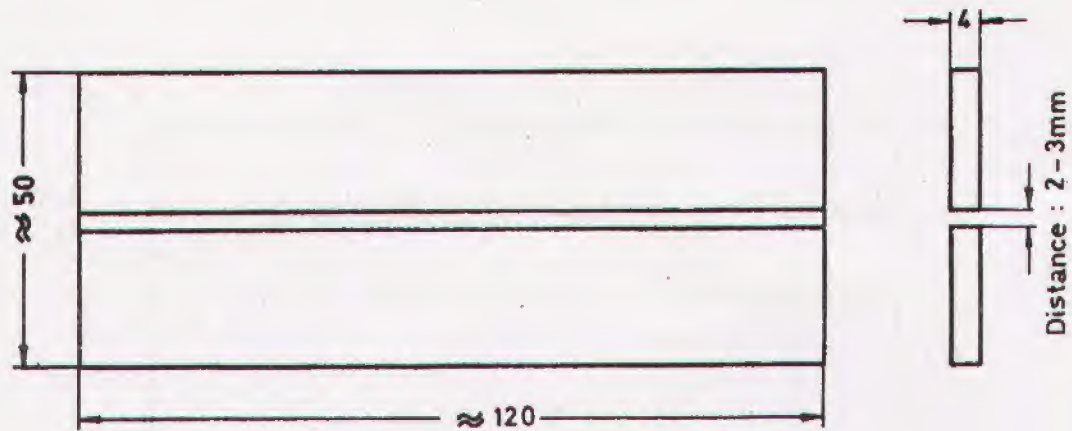


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING


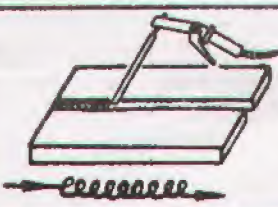

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



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### SEQUENCE OF OPERATIONS.

No.	Symbol	Tools	Descriptions
1		ELECTRODE 3.25 mm	START TACK-WELDING TO PREVENT DISTORTION
2			MOVE SLIGHTLY, ROTATING WITH THE ELECTRODE. THIS ENSURES EQUAL MELT- ING OF MATERIAL AND WELDING TO THE ROOT.
3			CHECK THE REVERSE SIDE FOR PENETRATION.

SCALE 1:1

MAT. MILD STEEL

SQUARE BUTT WELD

No.3. 3.2/2

ARC WELDING I

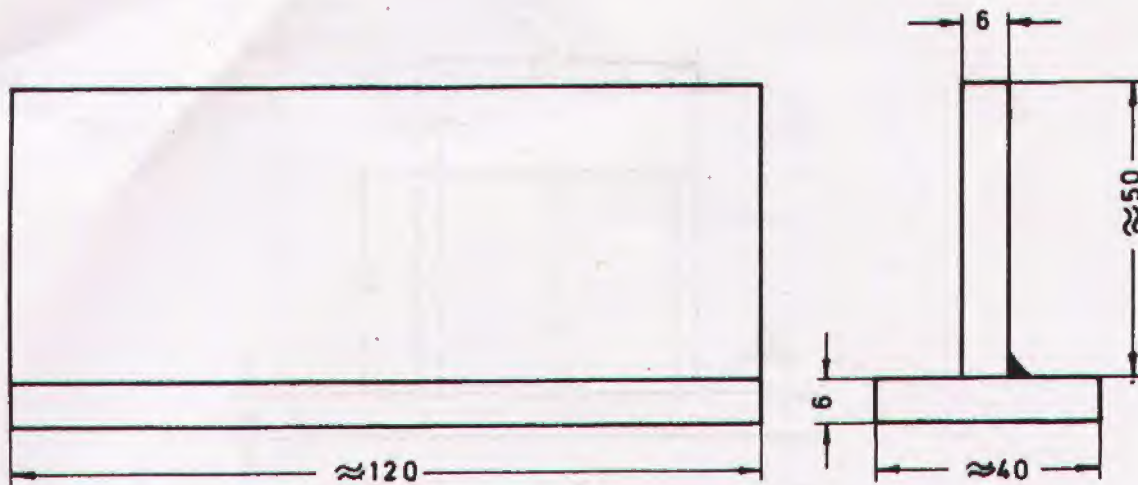


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



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### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		ELECTRODE $\phi 4$	TACK WELDING
2			WELD ONLY ONE SIDE. TRY TO GO AS DEEP AS POSSIBLE BY MELTING THE MATERIAL
3			CHECK IT BY BREAKING THE WELD

SCALE 1:1

MAT. MILD STEEL

FILLED WELD (horizontal)

No. 3.3.2 / 3

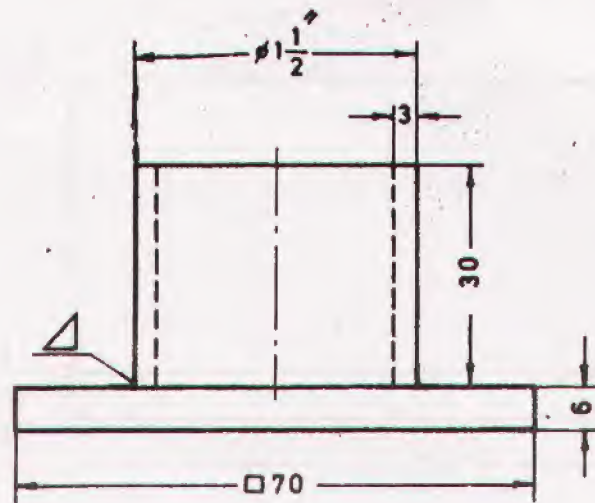
ARC WELDING I



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		ELECTRODE 3.25 mm	KEEP IN MIND THE POSITION OF THE ELECTRODE WHEN WELDING A THIN WALLED PIPE TO A THICKER FLAT PLATE.
2			THE WELD MUST BE EQUAL AND WITHOUT INTERRUPTION. CURRENT AND SPEED MUST BE PROPERLY ADJUSTED.

SCALE 1:1

MAT. MILD STEEL

## TUBE ON PLATE WELD

No. 3.3.2/4

ARC WELDING 1



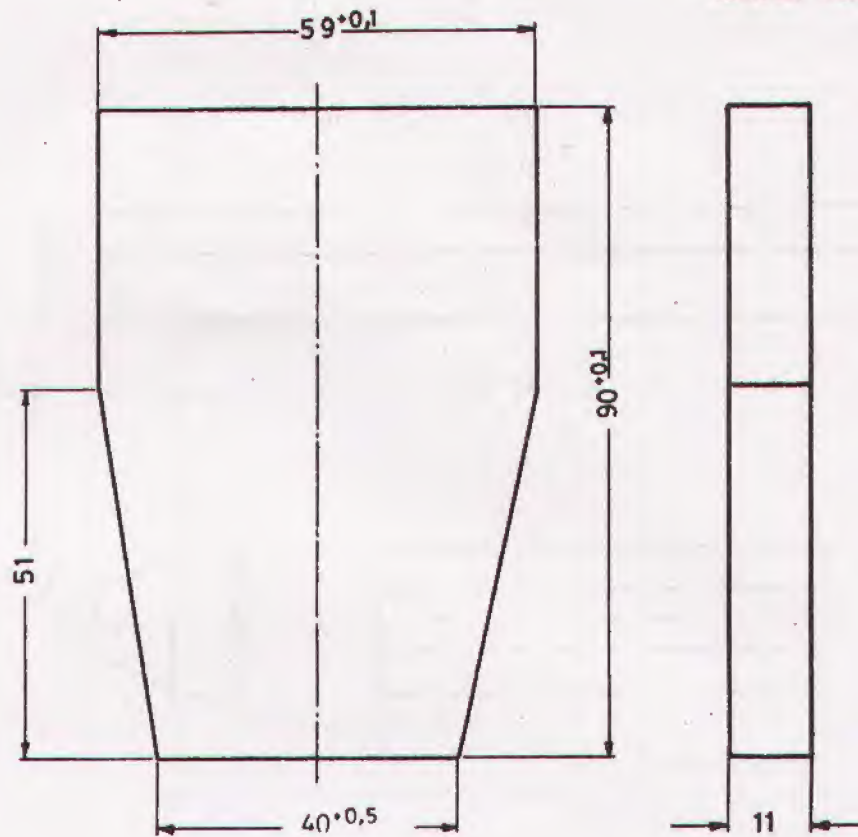
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PAK-GERMAN TECHNICAL TRAINING PROGRAMME

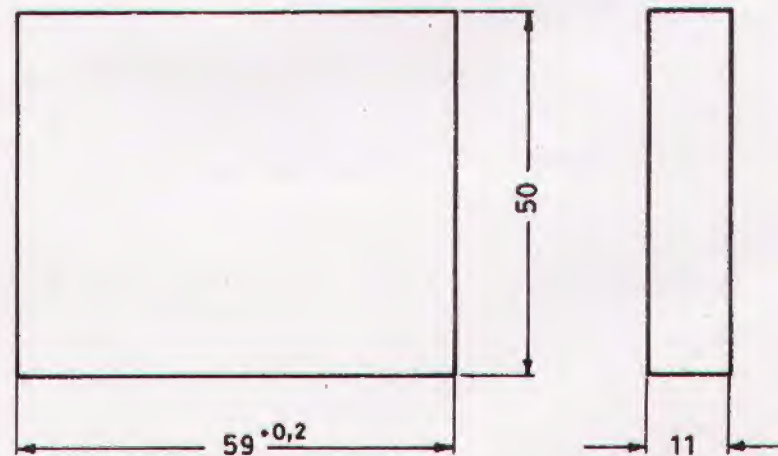




Tolerance  $\pm 0,1$   
unless otherwise stated



1



2

SCALE 1:1

MAT. MILD STEEL

## ASSEMBLING - & BASE PLATE

(For rocker arm)

No. 3.3.3 / 1

SHAPING II

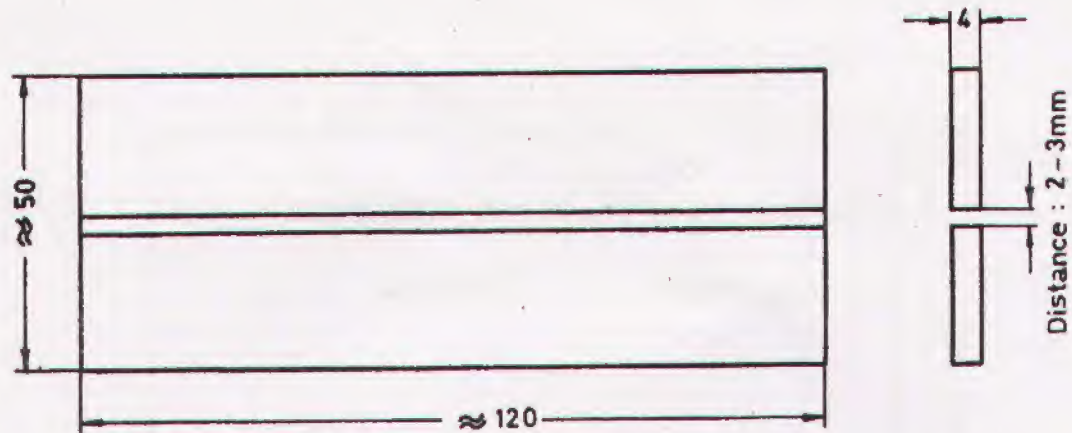


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING


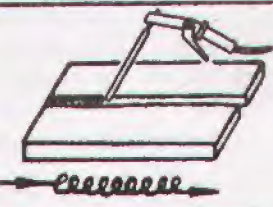

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



2



### SEQUENCE OF OPERATIONS.

No.	Symbol	Tools	Descriptions
1		ELECTRODE 3.25 mm	START TACK-WELDING TO PREVENT DISTORTION
2			MOVE SLIGHTLY, ROTATING WITH THE ELECTRODE. THIS ENSURES EQUAL MELT- ING OF MATERIAL AND WELDING TO THE ROOT.
3			CHECK THE REVERSE SIDE FOR PENETRATION.

SCALE 1:1

MAT. MILD STEEL

SQUARE BUTT WELD

No.3. 3.2 / 2

ARC WELDING I



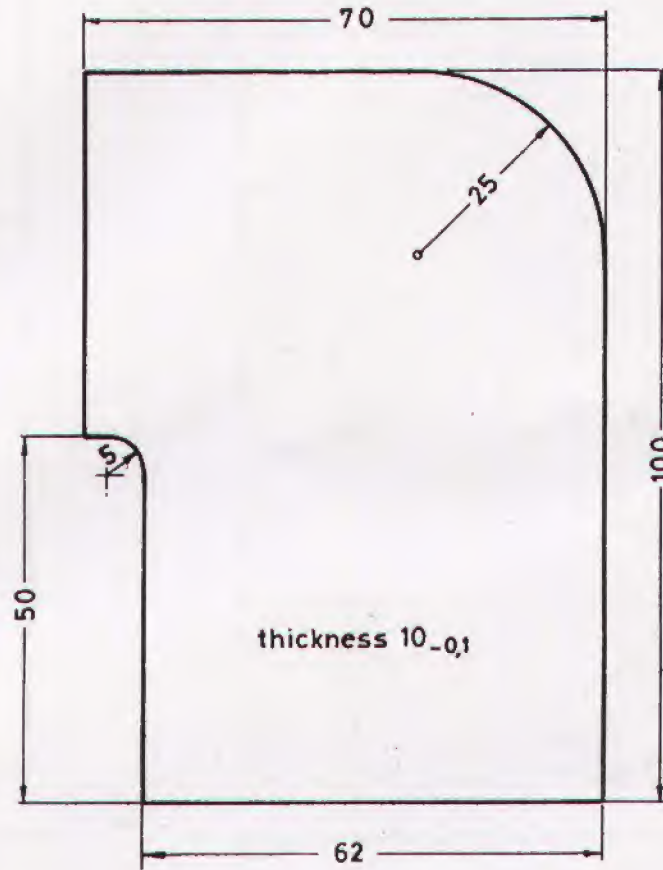
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PAK-GERMAN TECHNICAL TRAINING PROGRAMME



2 

Tolerance  $\pm 0,1 \text{ mm}$   
unless otherwise stated



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SCALE 1:1

MAT. MILD STEEL

CONNECTING PLATE

(For lever press)

No. 3.3.3 / 3

SHAPING II



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

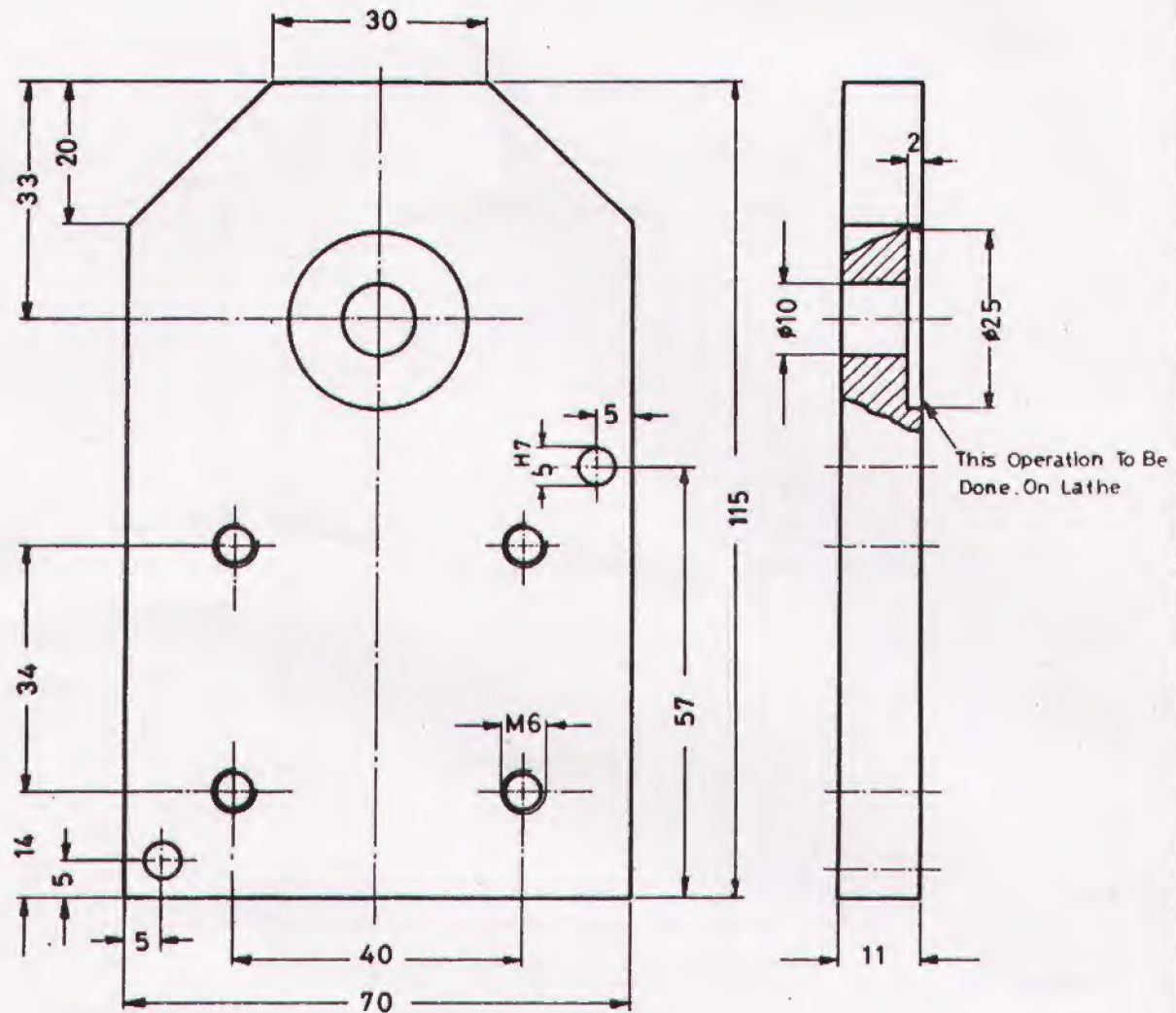
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MILLWRIGHT

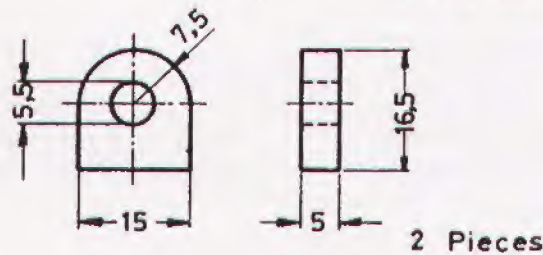


1

Tolerance  $\pm 0,1$   
unless otherwise stated



The pin and thread holes will be drilled according to part No. 2 during assembling.



5 H7  $+0.012$   
0

SCALE 1:1

MAT, MILD STEEL

BASE PLATE

(For lever press)

No. 3.3.3/4

SHAPING II

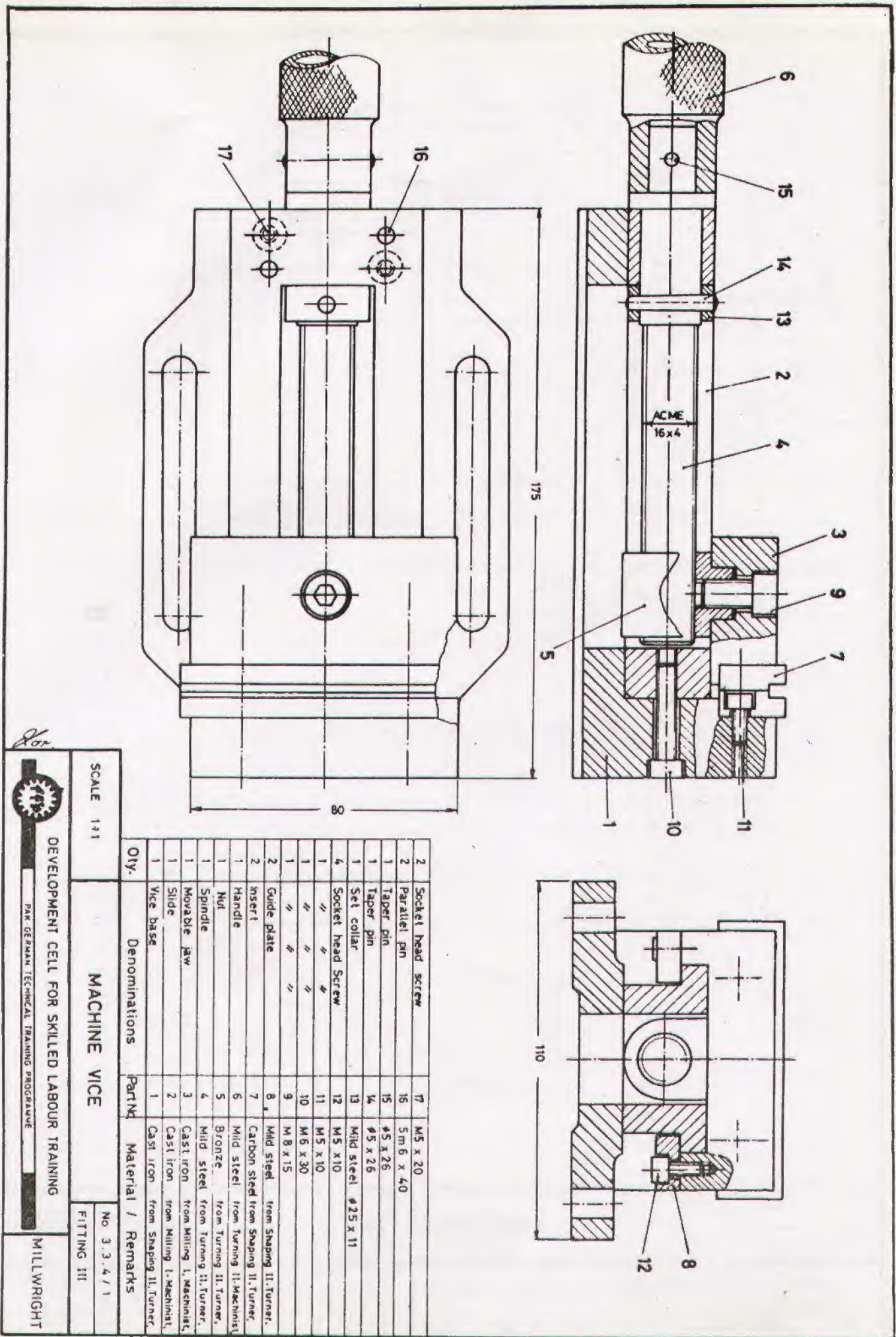


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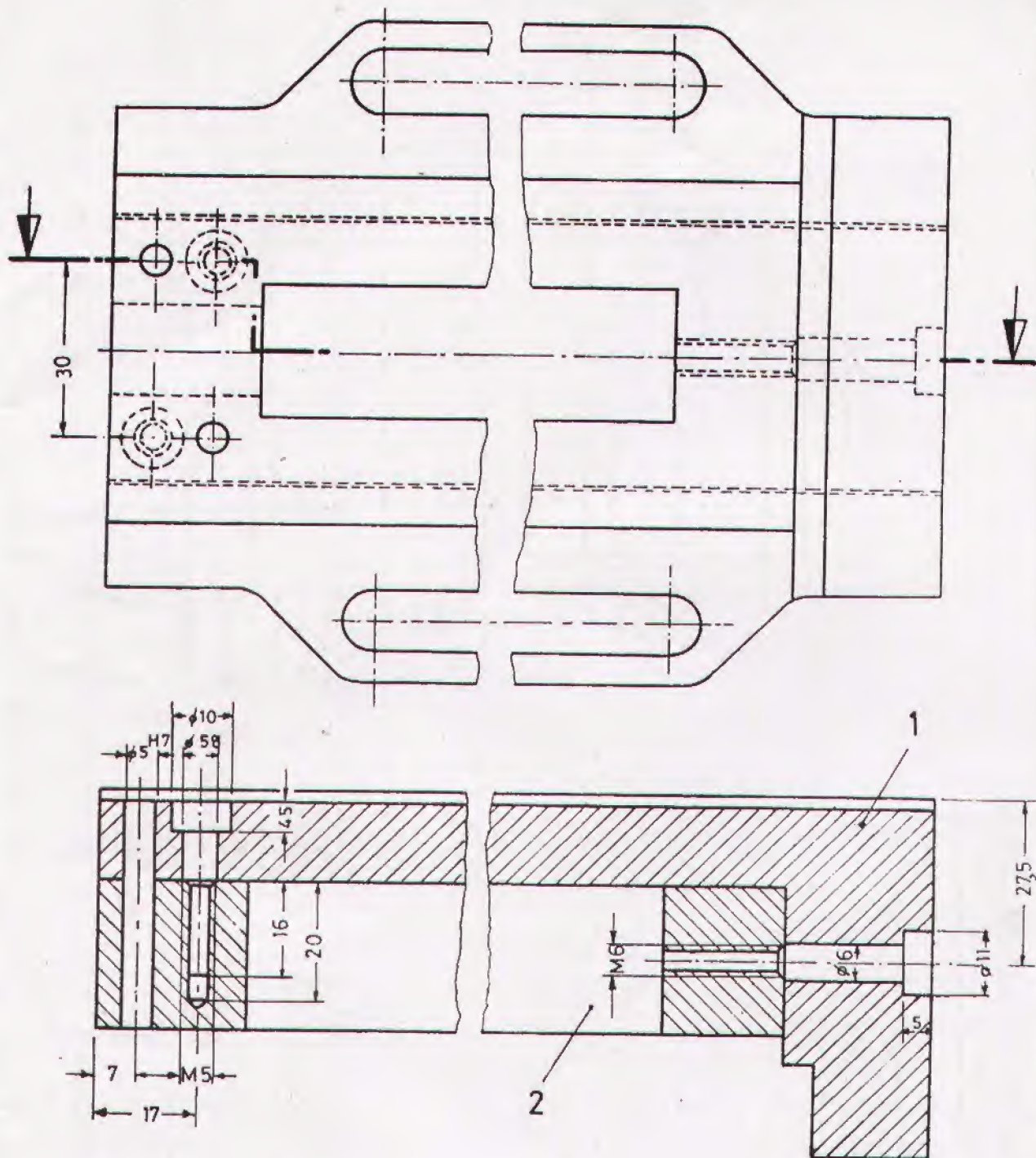
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MILLWRIGHT









SCALE 1:1

# MACHINE VICE (Detail for drilling)

No. 3. 3. 4 / 1-1

FITTING 111

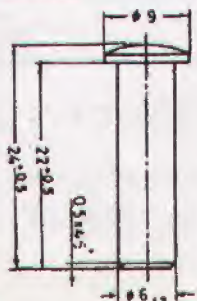
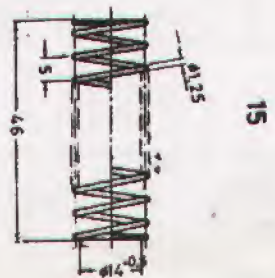
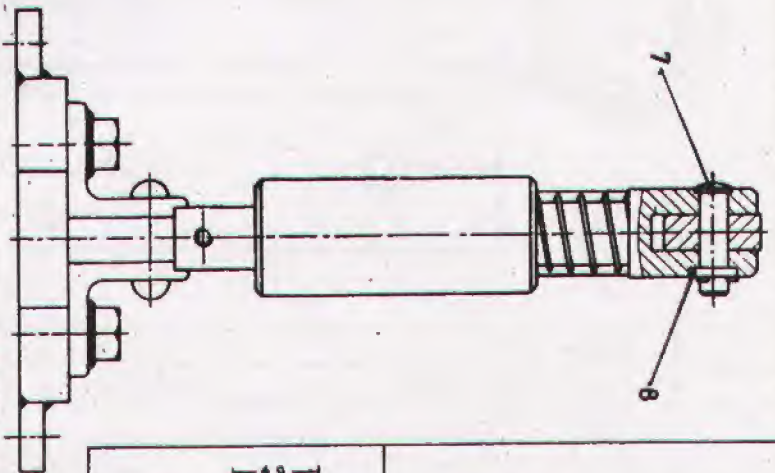
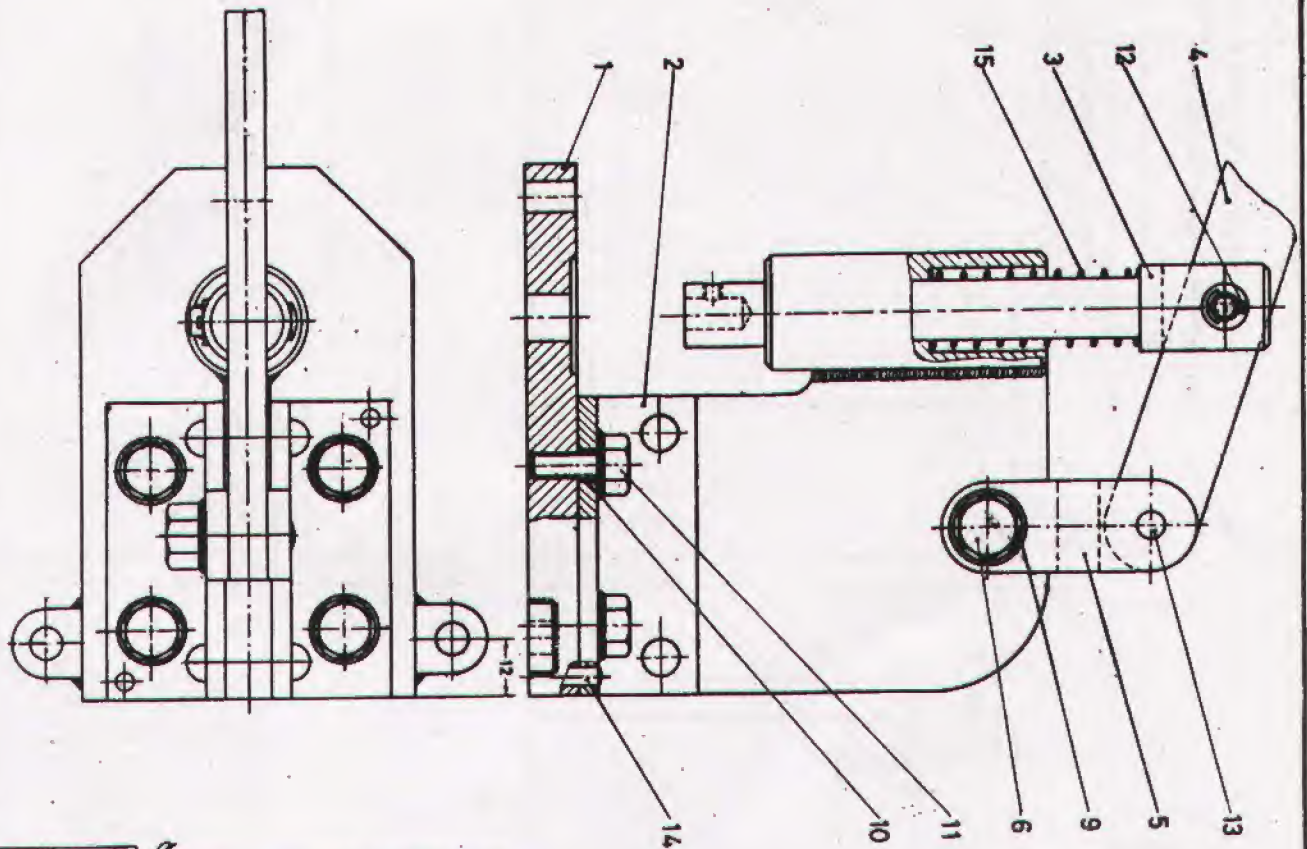


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MILLWRIGHT





Scale 2:1

Qty.	Denomination	Part No.	Material / Remarks
1	Pressure spring	15	Spring wire # 1.25
2	Cylindrical pin	14	# 6m x 15
1	Cylindrical pin	13	# 6m x 18
1	Spit pin	12	# 1 x 10
4	Bolt	11	M6 x 15
4	Washer	10	# 6.5
1	Washer	9	# 6.5
1	Washer	8	# 6.5
1	Pin	7	Low carbon steel
1	Step bolt	6	Low carbon steel from MILL WRIGHT TURN II
1	Link	5	Mild steel from Machinist Mill. II
1	Lever	4	Mild steel from Turner Shaping. III
1	Spindle	3	Low carbon steel from MILL WRIGHT TURN II
1	Body	2	Mild steel from MILL WRIGHT FITTING III
1	Base plate	1	Mild steel from MILL WRIGHT SHAP II

SCALE 1:1

LEVER PRESS

No. 3, 3, 4, 2

FITTING III

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

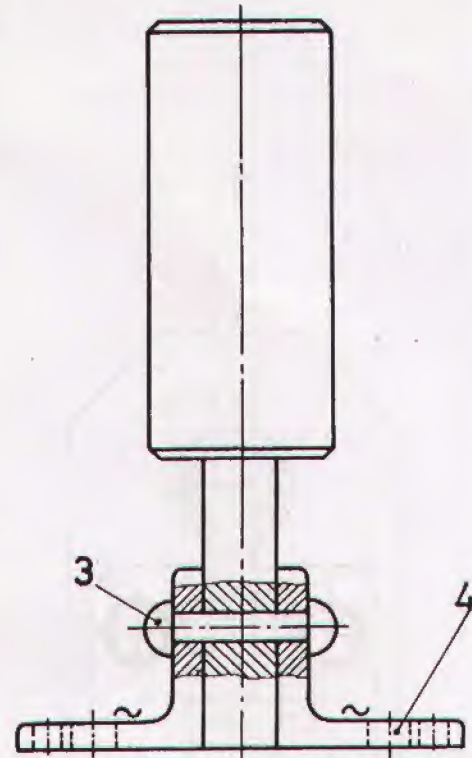
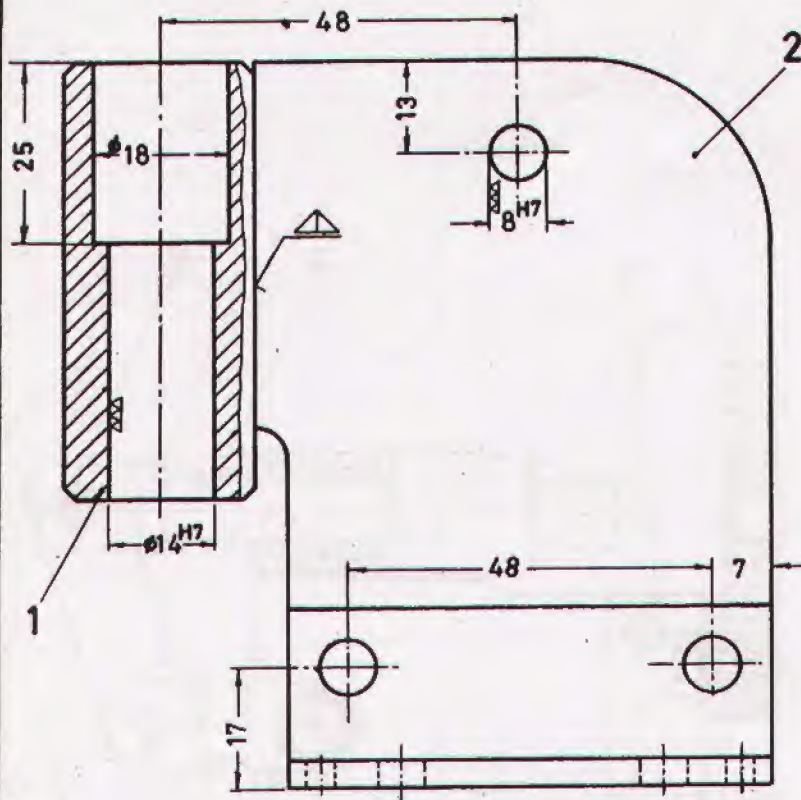
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MILL WRIGHT



W (W ~)

Tolerance  $\pm 0,1\text{mm}$   
unless otherwise stated.



H7	+ 0,012
5	0
H7	+ 0,015
8	0
H7	+ 0,018
14	0

The pin holes will be drilled together with part No. 1 of Lever press during assembling.

Welding of part 1 and 2 will be the first operation

2	Angle iron	4	25 x 5 x 4 mm
2	Snap head rivet	3	4 x 25
1	Connecting	2	Mild steel from Millwright Shap. II
1	Guide bush	1	Mild steel from Millwright Turning II
Qty.	Denomination	Part No	Material / Remarks

SCALE 1:1

BODY OF LEVER PRESS

No. 3.3.4 / 2-1

FITTING III

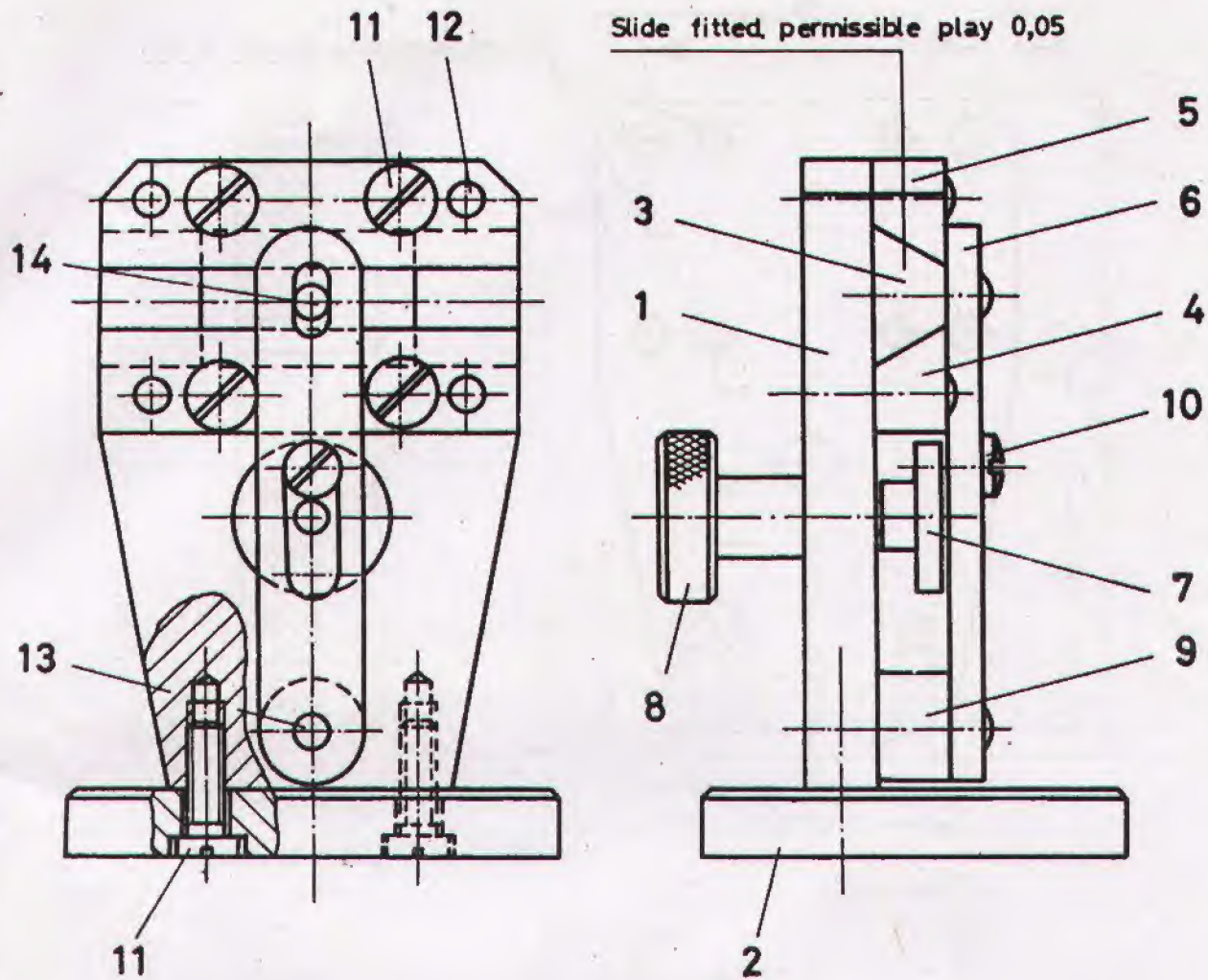


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MILLWRIGHT





1	Cylindrical pin	14	Ø5 m6 x 15
1	Cylindrical pin	13	Ø5 m6 x 25
4	Cylindrical pin	12	Ø5 m6 x 20
6	Cheese head screw	11	M5 x 15
1	Oval head screw	10	Mild steel Ø 11 x 30 Ready given
1	Distance ring	9	Mild steel Ø 15 x 10 Ready given
1	Knurling bolt	8	Mild steel from Turn. II MillWright
1	Carrier plate	7	Mild steel from Turn. II MillWright
1	Lever	6	Mild steel 16 x 5 x 82
2	Slide rail	4&5	Mild steel from Shap. II MillWright
1	Slide	3	Mild steel from Shap. II MillWright
1	Base plate	2	Mild steel from Shap. II MillWright
1	Assembling plate	1	Mild steel from Shap. II MillWright
Qty.	Denomination	PartNo	Material / Remarks

SCALE 1:1

## ROCKER ARM

No. 3.3.4/ 3

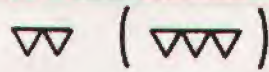
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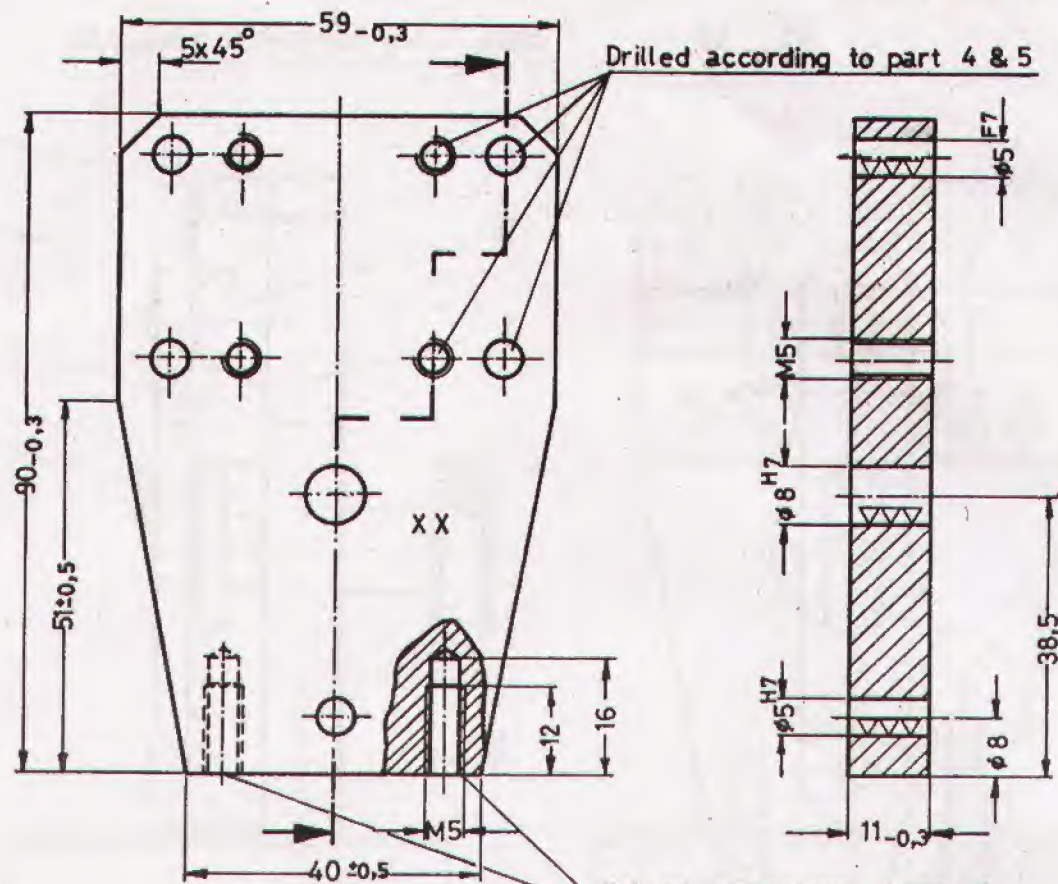
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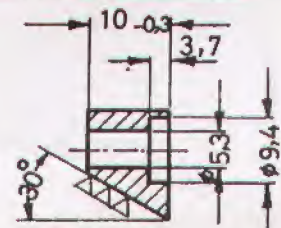
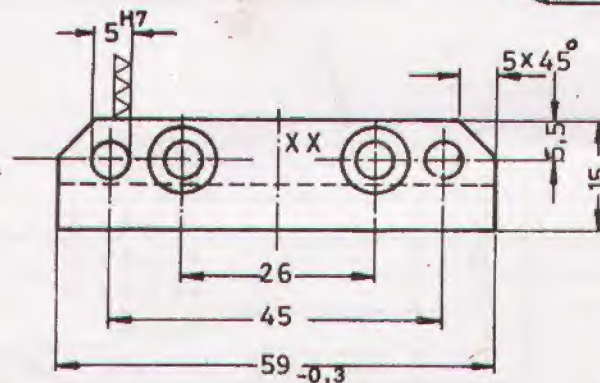




Tolerance  $\pm 0,1$   
unless otherwise stated



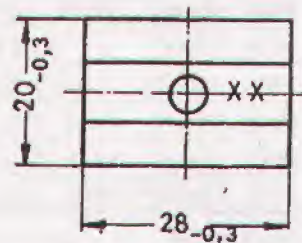
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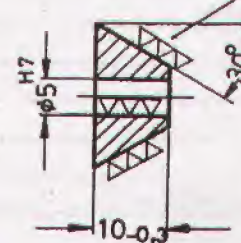
4 & 5

Caution! Part 4 without chamfers  $5 \times 45^\circ$

To fit between part 4 & 5



3



5 H7	+ 0,012 0
5 F7	+ 0,022 + 0,010
8 H7	+ 0,015 0

SCALE 1:1

MAT. MILD STEEL

ROCKER ARM

No. 3.3.4/3-1

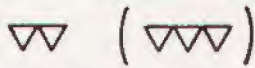
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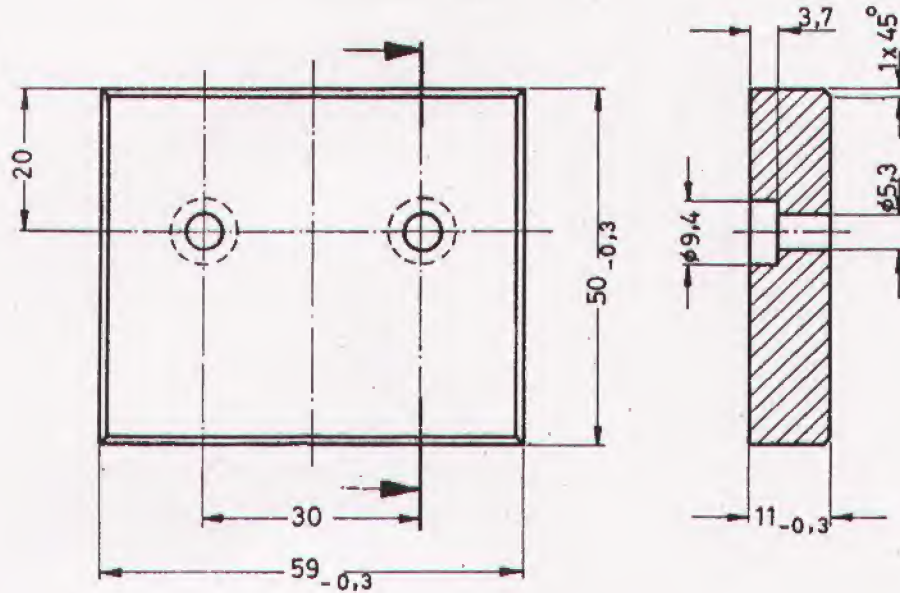
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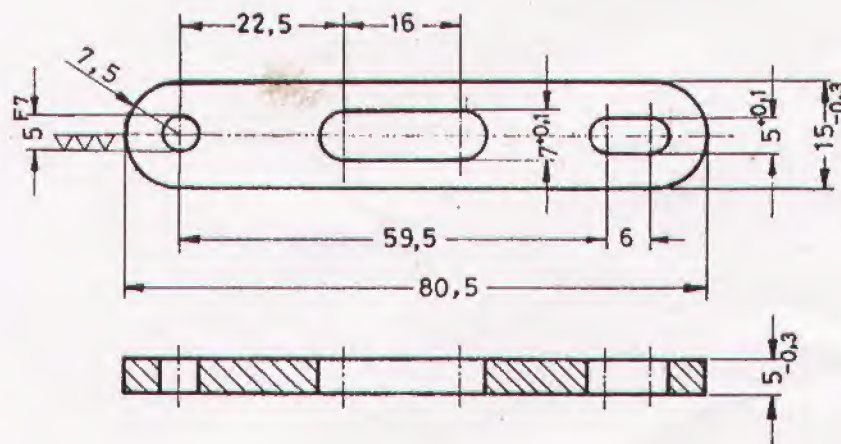




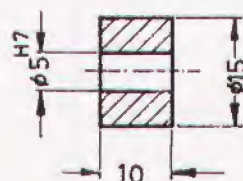
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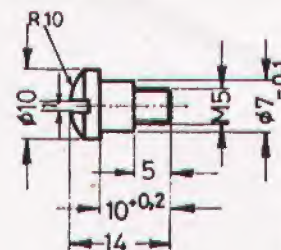
2



6



9



10

5 H7	+ 0,012 0
5 F7	+ 0,022 + 0,010

SCALE 1:1

MAT. MILD STEEL

ROCKER ARM

No. 3.3.4/3-2

FITTING III



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